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AUTOBIOGRAPHY
OF
**JOHN HENRY
DARLING**

1919

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A U T O B I O G R A P H Y
OF
JOHN HENRY DARLING
Civil Engineer. Astronomer
1919

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EARLY LIFE ON THE FARM

The date of my birth was April 15 1847. The place was a log house on my parents farm at Lake Ridge, Lenawee County, Michigan, about midway between the cities of Ann Arbor and Adrian. My parents were Henry Darling and his wife Matilda Osborn Darling. Regarding my father I will quote a portion on an obituary notice printed in the Tecumseh Herald (Mich.) of May 29 1873.

He was born in Woodbridge, New Haven Co., Conn. Feb 16 1810. Left at the age of 16 by the death of his father to his own resources he succeeded in meeting ordinary necessities and obtained, through unaided effort, a liberal education. In 1832 he came West and settled in Perrysburg, Ohio, where for a time he was engaged in the editorship of the Miami of the Lake, the first newspaper published in the Maumee Valley. In 1837 he was admitted to the bar, and for several years gave himself to the practice of law. In 1842 his health becoming impaired through severe sickness he was induced to retire from his profession, and coming to Michigan established a home upon a farm belonging to his wife, in the township of Macon, Lenawee County. Here he remained until his recent decease

* * * * *

At a time when his health permitted he served his township as Supervisor and as Justice of the Peace, and in the fall of 1850 was elected to the state legislature. Through his instrumentality in the legislature of 1851 measures were taken which led to the establishment of the scientific course in the University.

The date of his death was May 12 1873. My mother was born December 12 ¹⁸¹² ~~1912~~ in Seneca County, New York, on the farm of her father, Thomas Osborn, near the shore of Cayuga Lake. Her father was said to be of English descent. Her mother, Mary Hogarth Osborn, I believe was born in Ireland, at Ban Bridge near Belfast, and came to this country in early life. My mother died March 3 1897.

The highway in front of our house followed a natural ridge of gravel which undoubtedly was at one time part of the shore of Lake Erie. Hence the name Ridge Road which it is called, also the Lake Ridge post-office at our corners, and the village of Ridgeway a few miles to the southwest of us. My father was the first postmaster and the post office for a time was in our residence.

My father with his family moved to this place from Perrysburg



¹⁸⁴²
Ohio ⁱⁿ ~~about~~ the year ~~1840~~. The land was heavily timbered, with white oak, ~~swamp~~ swamp oak, hard maple, soft maple, white ash, black ash, elm, beech, butternut, shell bark hickory, basswood, whitewood and some black walnut. Of course one of the first things to be done by my pioneer father was to clear a portion of the land. Much of this was done before I was born but was continued after I was old enough to assist in the operation. Father hired some of the land cleared at a price of \$40 per acre. Enough of the oak timber was saved as was needed for rail fences and for framing timber for barns and a new house, whitewood was used for siding, shingles inside finish, and for some of the largest timbers of the barn frame, what hickory as was needed for fire wood, one black walnut tree was left standing "alone in its glory" and a few maples for ornament and shade, but the greater portion of the timber was "logged" or piled into heaps and burned. I often think with a kind of regret of the valuable hardwood timber that was burnt to clear the land when now the same timber would be worth a fortune for various manufacturing purposes.

Not all the land was cleared. some of it was left as a forest, or "woods" as we called it, to serve as a future supply of fuel and building material. Many were the hickory nuts, walnuts, butternuts and beech nuts that we children gathered to be eaten with keen relish during the winter evenings.

In these woods were great numbers of squirrels, mostly black squirrels but also gray and other kinds, the prettiest animals that ever lived. ^{But there} ~~There~~ were men and boys in our neighborhood who delighted in hunting these squirrels. Some were expert with the rifle and would brag of how many they brought down in a day. Years afterwards I visited the old farm and walked through the woods but to my sorrow could see no squirrels. The hunters had exterminated them. I did not think so much about this practice when I was young but with maturer years became convinced that the practice of killing wild animals for sport was wrong. The taste for crue sport is very prevalent and no doubt is inherited from our savage ances_



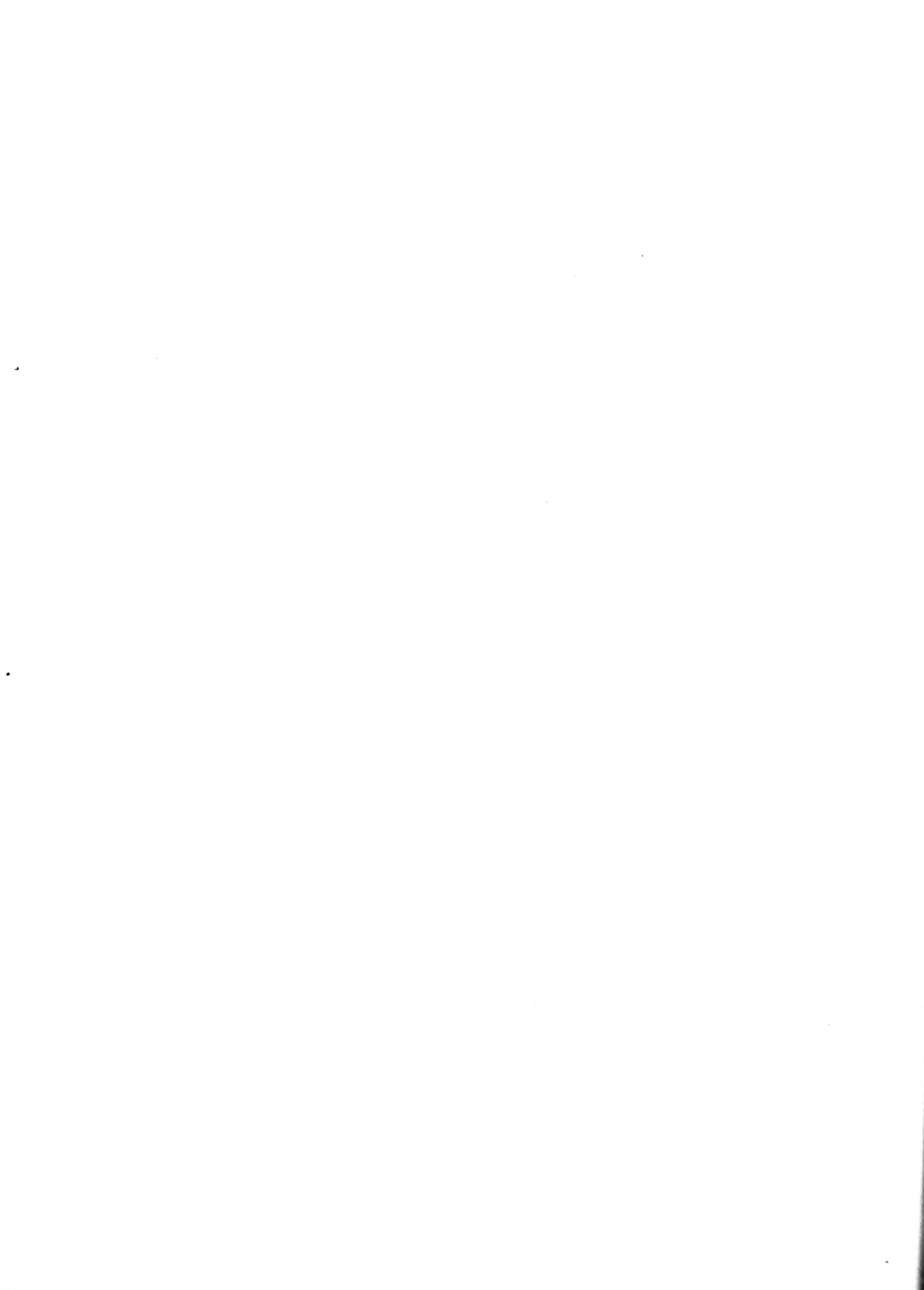
tors who depended largely upon wild animals for food and with whom hunting was both a business and a pleasure. It is my sincere hope that with advancing civilization and education more humane ideas will ultimately prevail, and a ~~sympathy~~ feeling of sympathy for all living creatures that will prompt us to protect them.

There were two beaver dams on a small water course which ran through the land, the work of these industrious animals during some former ~~time~~ period. None were living in my time. A creek not far away with what we called "deep holes" in it provided opportunity for the boys to indulge in swimming, and for fishing, and this creek and the ponds of the beaver dams made skating in the winter. At one time during a winter when there was a thick mantle of snow on the ground there occurred a combination of rain and freezing weather which formed a thick coating of ice on the snow that sustained the weight of men and also of horses and sleighs. This made good skating over all that part of the country, over fields, on slopes and hillsides as well as on level ground. We boys did have fine sport while the temporary rink lasted, skating in all directions and coasting on our skates. I never saw anything quite like it before or since.

I remember when the mowing machine made its first appearance in our part of the country. My father bought a ~~small~~ Kirby combined mower and it fell to me to operate it. and reaper. It was a heavy machine, compared with those now in use and rather hard for a young fellow to handle, but I was fond of machinery and delighted in running it.

My early education was at the local district school. This was supplemented at home by the aid and encouragement of my father and by access to his rather extensive library. My mother too had a good common school and seminary education. The influence of such parents on my early life and training could not be otherwise than beneficial.

I was always fond of astronomy, and this taste must have been inherited from my father. I remember holding the watch and recording time once when father was observing an eclipse of the sun. The telescope which



he was using for this purpose was one ~~he had made himself that is he was~~
~~shaded with lenses~~ that he built with his own hands, with tripod mounting,
 except to purchase the lenses. It was as near as I can remember three
 or four feet long, and the tube was turned and bored out of solid wood.
 We used to look at the planets Jupiter and Saturn with it, and here were
 my first lessons in astronomy. I might add that my father when young had
 learned the trade of wood carving and was handy with tools. He also made
 two violins, one of which remained in the family and my father played on
 it. It had the appearance of other violins, and a good tone. This, and
 the telescope and other relics were unfortunately destroyed by fire many
 years ago.

ATTENDS THE UNIVERSITY OF MICHIGAN

When about nineteen I attended a term in the Tecumseh High School
 eight miles from home. Ill health prevented my taking this up sooner. In
 1868 I entered the University of Michigan, taking a select course the
 first year, then the course in civil engineering. Was obliged to drop out
 one year on account of illness but returned and graduated C. E. in 1873.
 Among my teachers whom I remember with esteem were: in engineering, Pro-
 fessors De Volson Wood, Charles E Greene, S W Robinson, J B Davis; in
 astronomy, Professor James C Watson; in geology and botany Professor Al-
 exander Winchell; in physics Professor Williams; in history Professor
 C K Adams; in English literature Professor Moses Coit Tyler; in German
 Professor Harbison; in French Professor Morris. Dr E O Haven was presi-
 dent when I entered, and he was succeeded while I was there by Dr James
 B Angell. Most of the foregoing were men of distinguished ability, who
 gave character to the university and its growth was rapid. My father
 died about a month before my graduation. He was had been much interested
 in my course of study and was confident of my success

My four years' course in the university cost about \$1200, a very
 moderate sum. My father gave me part of this and also paid me wages for
 work on his farm during the summer vacations. Tuition was free to resi-

dents of the state, and the living expense at Ann Arbor was much reduced by the popular students' clubs. About 15 or 20 students would form a club, employ a lady at a private house to cook and furnish dishes, while one of the club members acted as steward and bought the provisions. The bunch was a social lot of fellows so that our meal time passed pleasantly. We had good cooks, good wholesome food and just what the majority wanted. In looking over my expense account for the first four months I find that our table board at the club cost about \$2.25 per week.

At this point I will refer to a service my father performed for the University of Michigan. The notice of his life already quoted mentioned that through his instrumentality in the legislature ~~and~~ measures were taken which led to the establishment of the scientific course in the University. It may be added that in accordance with time honored custom the colleges in that period devoted much attention to the study of the ancient languages, Greek and Latin. Mr Darling was impressed with the importance of scientific study and the sufficiency of the English language for imparting knowledge, and in accordance with this idea he introduced a resolution in the House, at Lansing, in March 1851 providing for additional courses of study which would exclude the ancient languages. He supported the resolution by a carefully prepared speech. This was printed in the Tecumseh Herald of March 27 1851, and while on a visit to Tecumseh, Michigan, in 1894 I looked it up in the files of that paper and copied it. I cannot help feeling proud of that speech. It is stated that the resolution was unanimously adopted.

It is interesting to note that the foregoing was, as I believe, the first step taken towards the establishment of the scientific and technical courses of study in that university which have since become very largely developed, and undoubtedly the example of this institution has had a powerful influence in shaping the courses of study in all the colleges of this country.

WITH THE U S LAKE SURVEY

Immediately after my graduation in June 1873 as Civil Engineer

I obtained a position on the U S Lake Survey as Sub-Assistant Engineer, thanks to my college training and the kind indorsements of my professors and instructors at the University. For a time I was employed in the office at the Detroit headquarters of the Survey on computations relating to survey work and mapping. Here was a force of computers and mappers always at work, and the number of these was largely increased in the Winter by assistant engineers and recorders who were engaged in the field work of the survey during the summer season. The rodmen, chainmen, cooks laborers and others, who made up the greater part of the field parties were of course laid off in the winter

The chief purpose of the U S Lake Survey was the preparation of maps or charts of the Great Lakes and connecting waterways for the use of navigators. It was begun in 1841 and had increased to a large force with extensive operations conducted by the War Department under the direction of the Corps of Engineers aided by civilian assistant engineers. The surveys as I know have generally been carefully and correctly made, and the finished charts are executed in the highest style of the art of mapping. For a time the charts were issued free to vessels navigating the Great Lakes, but now they are sold to mariners and to the public at the cost of paper and printing

The officer in charge during the time I was on the work was Gen. Cyrus B Comstock. He was a capable administrative officer, strict and methodical, and conducted the work honestly and economically. He was technically well qualified, and gave his full time and closest attention to the operations. He was rather reserved and not easily approachable but was much respected by his employees. His rules and regulations were carefully observed and the discipline of the entire force was excellent.

Gen. Comstock did not confine his operations to the production of maps but planned to bring out certain other results of scientific value.

I will try to explain one important thing he sought to accomplish incidental to the survey. The system of primary triangulation which formed the skeleton of the survey, as it might be called, covering the lakes, was extended inland in places so as to form triangle nets suitable for the determination of the lengths of arcs of parallel and of the meridian. Thus a continuous chain of triangulation, depending upon eight carefully measured bases suitably located, was extended from Saint Ignace Island on the north shore of Lake Superior to Parkersburg in southern Illinois, a distance of ~~ten~~ ten degrees north and south, and from Duluth by way of Chicago across southern Michigan and along the lower lakes to the east end of Lake Ontario, a distance along its axis of 1,300 miles. This triangulation was incidental to the survey of the lakes and was measured with the greatest precision possible, not only to insure correct positions and distances on the charts but in order that it might be of value in a more accurate determination of the form and dimensions of the earth.

My own work was chiefly the measurement of angles of the triangulation. Not long after I joined the survey the classification of Sub-Assistant was abolished and thereafter my position was that of Assistant Engineer. I was fond of instrumental work and the measurement of angles ~~was~~ suited my taste. Fine large theodolites were furnished for the purpose. For a time I used a Repsold theodolite, made in Hamburg, and later one made by Troughton & Sims of London with a 14-inch horizontal circle provided with three reading microscopes. Usually my field party consisted of three: myself in charge, a recorder and a helper. We made our observations at stations located at suitable points along the lakes distributed at distances of ten miles or less up to forty or fifty miles apart. Wooden towers were erected in advance by contractors, high enough for the observer to get a line of sight from one station to another above houses, trees or whatever obstruction there might be. Many of them were more than a hundred feet high. They were climbed by a ladder, and the instrument in its box was hoisted to the observing platform by tackle.

There were other similar observing parties working along the same system of triangulation, distributed so as to advance the work more rapidly. Often there would be a party at each end of a line, and in such case each would assist the other in the way of setting targets, or if on a long line by flashing sunlight from a mirror through a small aperture directed towards the distant observer. We learned to converse with each other by means of these flashes and the Morse telegraphic alphabet by cutting off the sunlight so as to form dots and dashes

The party boarded at hotels when they were found near enough to the stations, but more often with farmers, and they were generally accommodating and willing to take us in if we were willing to live as they and pay them for it. We quickly and cheerfully adapted ourselves to the situation, and were glad to get most any place to eat and sleep. At Long Point, Canada where we stayed several weeks observing over several lines that ran across ~~the~~ Lake Erie in different directions, we got our meals with a game keeper for awhile, and then had to look out for ourselves. We obtained supplies, lived in a tent and did our own cooking. It was a low swampy country and I remember it was rather hard at first to drink the warm water dipped from the shallow beach in warm weather. The mosquitos bothered us so we went up and slept on the platform of the observing tower ¹²⁰ ~~150~~ feet above the ground. Even there the insects followed us when the weather was calm. This was in September 1876. Mr L D Wines was my recorder that year, who is now a professor in the Ann Arbor, Mich., High School

At some of our stations we found very good accommodations with farmers who were well-to-do, kind and hospitable and seemed glad to have us stay with them. It was so at a station near Sandusky, in Sept 1877, where Mr C H Ransom treated our party royally, and at Mr J Dean's on Kelley's Island, and at Mr Thaddeus Smith's on Pelee Island in October of that year. These places were in the famous Lake Erie grape country, and

at the time when the grapes were ripe, and we feasted on the fine fruit as never before or since. My recorder then was Mr B H Colby, now Consulting Engineer at St Louis, Mo.

My work extended from Cape Vincent on the upper end of St Lawrence River over portions of Lake Ontario and the state of New York, Lake Erie and portions of Ohio, into Michigan as far as Tecumseh and Fairfield in Lenawee County, and in Illinois from Lake Michigan to Parkersburg, not far from Danville and Olney, where the field work ended in December 1879. The observation towers were strongly built and well anchored, but were only for temporary use and probably have now all disappeared. Permanent underground marks or monuments were however established which usually can be found and made use of at any future time, ^{but some have been destroyed by public improvements or other causes} These station marks are fundamental points whose latitude and longitude have been accurately computed, also the azimuths or true bearings of all the lines joining these stations. This data, and a description of the station marks is printed in government publications accessible to all and is of great value in furnishing base lines or starting points for future surveys, either of the Great Lakes and their harbors or of the states bordering on the lakes, and will be appreciated by engineers and surveyors.

The field work ~~was~~ mentioned was interesting in an engineering way, and proved also a valuable education and experience to me when a young man by taking me over much of the country and bringing me in contact with the people. My friend Mr Thomas Russell who had charge of another party on the same work at the lower end of Lake Ontario in this way found his future wife, then a Miss Bush, whose parents living near Cape Vincent provided his party with accommodations

The Lake Survey office was on Grand Avenue, Detroit. It was an old building and looked as if it might have once been used for a school. There was a small astronomical observatory at the rear, equipped with instruments for determining time, longitude and latitude. I remember doing some record-



ing of observations, and sometimes observed with the instruments myself.

Among the engineers in charge of parties similar to my own on the triangulation work I will mention George Y Wisner who later attained distinction as a civil engineer in private practice, and was member of a board of engineers that made surveys and estimates for a deep water channel from the Great Lakes to New York; also R S Woodward who later was a professor in Columbia University, New York, and is now president of the Carnegie Institution, Washington; and Thomas Russell who was afterward for a time with the U S weather department at Washington and author of a treatise on meteorology, and is now ^{again} Assistant Engineer on the U S Lake Survey at Detroit.

Vacation and European Trip. In the year 1878 there was but a small appropriation of money available for the Lake Survey making it necessary to reduce the force employed, and I was among the number discharged. The date of my discharge was May 17, and I was reemployed October 4 thus giving me an enforced vacation of 4½ months. Part of this interval was made use of by me for traveling, including a brief trip to Europe. It was the year of a world's fair or exposition in Paris and I took advantage of my freedom to go and see it. I started June 11 from Detroit and sailed from New York June 13 on the steamer State of Indiana of the State Line. The steamer was not of course as large or fast as those of the present day but was comfortable and even seemed to me elegant. The meals were the best I thought I ever tasted. I remember the delicious boiled hams that were brought entire on the dining table and carved by the Captain, a hearty Scotchman. Alas, it was not for me to long enjoy those sumptuous meals! In about two days after sailing the rolling of the vessel got the best of me and I remained in my cabin for eight days seasick. The whole time of the trip to Glasgow was eleven days. Life on the ocean wave was not a joy. However as we came in sight of the north coast of Ireland my illness suddenly disappeared and I went up on deck and took in the sights as we sail-

ed through the quiet waters of the Firth of Clyde. The islands we passed presented a beautiful sight with their sloping sides covered in places with green fields. Going up the Clyde River I sat on deck viewing the scenery and reading a guide book at ten oclock in the evening by daylight or a bright twilight. This was in a higher latitude, nine degrees farther north than Duluth and on June 24 when the days were ~~the~~ near the longest of the year.

Two days were spent in Glasgow, looking over that large commercial city, then a day in Edinburgh, a night in Leeds and three days in London. A guide book and map enabled me readily to find my way around the great city. Engaged a room with a private family on Thanet Place near Temple Bar, and ate at restaurants. A policeman of whom I inquired directed me to this room. After engaging the room and was starting out to see the city I inquired of the landlady her name. "Mrs Artser" she politely replied. I was not quite sure, and she repeated it. Then I said, Oh it's Mrs Art! Even then I did not understand that it was simply her way of saying to me "Mrs Hart, Sir".

I took in a few of the principal sights, like the Parliament building, the Tower of London, heard the great Spurgeon preach one Sunday at his Tabernacle, where a contribution was collected of each and everybody as they entered the door, and attended a grand opera, Les Huguenots, at the Royal Italian Opera, Covent Garden. Walking along a street I noticed ^{the sign} of a phonograph on exhibition. Entering, it seemed to be an art studio, and a fine looking lady showed me an Edison phonograph which had only recently been invented and was the first I had seen. Paying a fee of 25 cents I listened to some talking records, by inserting a tube in each ear. The words were by no means distinct, - nothing to be compared with the instruments of the present time, yet it was a great novelty, and a wonderful invention. One day Mr Hart and I took a little trip around the city together, by my invitation. He remarked that it was the first

time he had seen London although he had lived there all his life.

I had brought an overcoat with me, which was certainly needed on the ocean trip, but not on land as the weather was warm, and I left it with my London landlady while I went on into France, and all that I had with me then was the business suit which I wore and a small valise with some linen and changes of underwear, guide books, maps etc. No baggage to bother me. This made traveling easy. I stopped and got my overcoat on my return

My stay in Paris was for eight days, and the chief attraction was the Exposition which was then in progress. It was the first I had seen, and there had not been many such world's fairs ever held, but they are quite frequent in these later years. The Exposition was elaborate and artistic, but perhaps with fewer articles of practical utility than are seen in our more recent American expositions. The Trocadero ^{a fine building} Palace, ^{at} one end of the grounds was built for this exposition, and is now used for a museum

There was a tramway line running from the central part of the city to the Exposition which was patronized to its capacity; but no crowding or standing in the car was permitted. I remember once trying to jump on a car that was filled, but the guard standing at the entrance grabbed me and shoved me back so suddenly that I was left standing in amazement. I believe the American ^{custom} of packing street cars on special occasions is the better way, in order to carry the crowd more quickly and avoid long waits on the street corners; but I like the way that rules and regulations are enforced in Europe in contrast with the laxity that too generally prevails in this country.

On the return trip I passed through London, Holyhead, was in Dublin for a day and another day in Belfast, and so saw a little of Ireland, ~~the~~ a land of beauty and fertility but afflicted with political oppression. I sailed from Larne (the port of Belfast) July 13, after a stay in Europe of only 19 days. This visit however left lasting impres-

sions on my memory. My return trip on the ocean was on the State of Louisiana, which was another steamer of the State Line, and I arrived in New York July 28, 6½ weeks after the day I ^{had} sailed from that city in the "land of the free".

~~Ex~~ While in Europe I kept no diary, but did keep an expense account, as had long been my habit. Looking over this I note a few of the items:

Steamship, New York to Glasgow and return. First Cabin	\$100.14
Admission the Exposition, Paris	.20
Opera Comique	.50
Theatre Francaise	.20
Drive in Dublin in an "open car" with driver, 2hrs, I alone	1.00

It is stated in a note that if I had returned directly to Detroit after landing in New York, instead of spending some time in the eastern states, the entire expense of my trip from Detroit to Europe and return would have been about \$270, of which about \$170 was for steamer and railway fares. This looks very small from our present stand point. My habits, it may be remarked, were those of a farmer's boy and of a civil engineer, and besides money went farther in those days than it does now.

Before returning to Detroit I visited the old home of my father in Connecticut near New Haven, the house ^{as} still standing where ^{lived} my Darling ancestors for several generations; then my mother's former home near Sheldrake, on Cayuga Lake N Y; and later accompanied by my mother, visited my parents former home in Perrysburg Ohio. On the 4th of October I was re-employed by the Lake Survey, with an increase of salary

MISSISSIPPI RIVER SURVEY

From Nov 18 1878 to March 4 1879 my work was on a survey of the Mississippi River which had been added by Congress to the duties of the Lake Survey and which had been commenced in 1876 under the direction of Gen. Comstock. Here I was in charge of a party on hydrographic and topographic surveys, and my work started a few miles below Memphis, proceeding down stream. My party consisted of about forty men, as near as I can

remember, surveyors, boatmen, laborers, cooks etc. We lived on a quarter-boat, the Mississippi, which had been built for the purpose. There was another similar party working on another part of the river, and another smaller party doing a different kind of work. The quarter-boats were moved from one point to another on the river as the work progressed by a steamer called the Eagle chartered by the Government and in charge of Lieutenant D W Lockwood of the Corps of Engineers, who may be remembered as the officer in charge of the Duluth District for a time about two years ago with the rank of Colonel

The work of my party included triangulation, ~~spiritual~~ topography by stadia, and soundings of the river channel. The growth of timber, bushes, cane brake etc on the low land adjoining the river was dense and required a great deal of cutting to open lines of sight

At one time during the latter part of the winter a large amount of floating ice came down the river, in cakes and large fields. Our boat was moored to the outer bank of a bend in the river in an exposed place and the ice field came on us so suddenly that we did not have time to move to a more protected place, and the outer end of the hull was crushed in causing the boat to fill and sink. The forward end however remained above water. No person was hurt, but there was a loss of various articles besides the damage to the boat. As the result of this accident my party had to live in tents the remainder of that season

This survey was a preliminary step to the improvement of the Mississippi River for navigation by providing a deeper channel up as far as St Louis. The work of improvement and maintenance of a channel has now been in progress for the last forty years or so at great expense, and what have been the returns? No navigation of the river of consequence, to make use of the improved channel, and no increase in commerce. Instead the commerce has decreased. It looks as if the many millions expended on this improvement was money wasted, and a serious mistake, at the ex-

At the close of the winter's survey work on the river I returned to Detroit and resumed work on the Lake Survey

My marriage to Miss Adelaide Ford of Tecumseh Michigan took place on Feb 25 1880 at her home, and I took my bride to Detroit where during ~~my~~ the two remaining years of my stay she shared with me the pleasures and advantages of life in that fine city

The Lake Survey came to a close of active operations in the year 1882, having completed its charting of the lakes as far as then planned, and the employees were discharged. A few entered other departments of government work, some took up private engineering practice and some took positions as teachers in colleges. A number of these were highly successful and gained distinction in their chosen fields

Some years later the Lake Survey resumed operations for the purpose of correcting and revising the existing charts, also re-charting portions of the lakes and making additional charts where needed. Other work taken up was the gauging of the flow of connecting rivers, investigating the effect of withdrawal and diversions of water, keeping records of water levels, determining variations of the compass and other magnetic work, etc. It is now a very active and efficient organization

The final report of the Lake Survey, covering its operations from its beginning in 1841 to its temporary close in 1882 is contained in one large volume entitled, Report upon the Primary Triangulation of the United States Lake Survey, by Lieut-Col C B Comstock, Corps of Engineers, Brevet Brigadier-General U S A, Aided by the Assistants on the Survey. Washington, Government Printing Office, 1882. The volume is also designated, Professional Papers of the Corps of Engineers, U S Army, No 24

ST PAUL ENGINEERING DISTRICT

The date of my discharge from the Lake Survey was July 1882. With the assistance of Gen. Comstock I immediately obtained a position as draftsman with the U S Engineer office at St Paul and was located there during the following two years. Besides drafting my duties included some

engineering work in the field, on the Red River of the North and on the St Croix River, and I made a trip in July 1884 to the headwaters of the Mississippi River to take photographic views of the reservoir dams which were then under construction by the Government. That was before a railroad had penetrated that country, and traveling was more difficult than it is now. Leaving the railroad at Aitken I went up the river to Grand Rapids by the new side wheel steamer Andy Gibson which was ~~then~~ then making trips between those places. It was a good comfortable boat, but the sand bars made navigation rather difficult. Then by team to the dam at Pokegama which was being built. Archie Johnson was the Assistant Engineer in charge of the work. From Pokegama to Winibigoshish was a canoe trip. Dr Walker, Government physician, was with me on that trip. We started early one morning, made ten portages across bends in the river, and it was midnight before we reached the camp near the dam at Lake Winibigoshish. In taking views I would make a number of exposures during the day, with 6½ by 8½ plates, develop the plates in the evening in a room darkened by shading the windows of my room, and make proof prints the following morning on a special blue print paper. Black prints were made after returning to St Paul.

From Lake Winibigoshish to Leech Lake was another canoe trip with portage. The Government dam at Leech Lake was pretty well advanced. The Soo Ry now passes near this point, and has a station there called Federal Dam. Here (in 1884) the Government had a steam launch which took me from the dam at the ^{outlet} ~~entrance~~ of the lake to the village of Walker, where I found transportation by stage to Brainard. The stage ride was much of the way through white pine timber. We saw one deer, off a little way running through the bushes. Blueberries were plentiful, and we passed groups of Indians gathering them. We occasionally stopped the team and gathered what we wanted to eat of the fine berries. The Indians I was told were picking them for the market. A family of them with all their

belongings would stop at a place where the berries were plentiful, live in a teepees, stay until they got all the berries within ~~max~~ easy reach, then move on to another place, taking the berries in to town to sell

ASSIGNED TO THE DULUTH ~~DISTRICT~~ AND SUPERIOR HARBORS

After returning from the trip to the reservoir dams Major Chas J Allen who was in charge of the St Paul office assigned me to duties at the harbors of Duluth and Superior which were then included in the St Paul District. August 20 1884 is the date when the writer landed from the train in Duluth, the city which was henceforth to be his home and the headquarters for his activities as an engineer engaged in the ~~work~~ government work of harbor improvements on the great Lake Superior.

On my journey to Duluth the Northern Pacific train took me down the north side of the St Louis River along the picturesque rapids, through what is henceforth to be a state park. ^{This was before the road was} ~~The road has since been~~ changed to its new location called the Short Line

Duluth at that time was officially a village, and the population probably not more than ten thousand, but it was full of energy and expectations. Hon. J D Ensign was Mayor, and it is our good fortune to have him still with us as one of our most distinguished and respected citizens Superior, our sister city on the other side of the harbor, had a smaller population, possibly about one thousand, which was located mostly at what is now known as the East End, while West Superior was just having its birth

This was 35 years ago, a length of time which has qualified me for membership with the honorable company of people comprising the Old Settlers Association of the Head of Lake Superior. My arrival however was more than thirty years behind the coming of the real old settlers, those sturdy pioneers who laid the foundations of two important cities

Mr Guy Wells, better known as Major Wells, was then the engineer in local charge of government work in these harbors. Who of our citizens *that were here then* does not recall his tall massive frame and venerable

appearance? After retirement from government work Major Wells served the city of Duluth for a term as member of the Board of Public Works. He was the owner of property on both sides of the Bay, and built the row of brick residences on Sixth Avenue West, Duluth, between First and Second Sts.

The first work assigned to me was to make a survey of the channels of Superior Bay. In the following month, Sept 9 I was given charge of dredging operations. Mr Wells remained for a few months on government to complete repairs to piers at the entrances, and then I was made Assistant Engineer in local charge of Duluth and Superior harbors

The Duluth harbor basin was an area which had been dredged within the entrance ~~by the city~~ for providing a depth of 16 feet where the original depth was 7 or 8 feet. The size of this basin was 70 acres exclusive of a 150-foot margin along the dock line, - a small area compared with the present enlarged basin of 446 acres with a depth of 20 feet at low water; but at that time the Duluth commerce was in its infancy and amounted to less than half a million tons (of 2000 lbs) of lake freight received and shipped per annum. It is more than sixty times as much now

There were also a number of channels in Superior Bay, natural and artificial, running through the shallow bottom of the Bay. One was the natural channel called the Main Channel, running diagonally through the Bay in front of Superior from Connors Point to the Superior Entry, which evidently is the original bed of the St Louis River through which its waters were discharged at a former time when the bottom of the Bay and the entire land at the head of the lake were some higher with respect to the outlet at the Soo than at present, and consequently the water of the Bay was shallower. Several channels had been dredged from the Main Channel to the shore by which vessels were enabled to reach the docks. One of these led to the Quebec and Northern Pacific wharves, ^{Superior} one to the mouth of the Nemadji River, and one ran along the east side of Rices Point to the Duluth harbor basin. My first work was to make surveys and maps of these

channels and basin. Many systematic soundings were taken and platted to show the condition of the bottom. The Duluth basin was quite uneven and many lumps were revealed, some of which had ~~been~~ already been discovered by the more direct and convincing method of running on them with a vessel

The dredges of Williams & Upham were set at work and during that fall and the following spring the basin was deepened and put in good condition with a clear depth of 17 feet at low water and no further obstructions were met by the vessels. Portions of the various channels in Superior Bay and of the Superior Entry were also deepened. The contract price was 14 cents a yard which was not high for that kind of dredging, that is the removal of shoals. Members of the dredging firm were John H Upham and his brother Erastus Upham, both well known Duluth citizens, and E T Williams of Chicago. The manager for the contractors was F B Daugherty, better known as Tine Daugherty, the genial politician and one time state senator, whom everybody liked for his cheerful disposition and witty conversation

For making the surveys preliminary to dredging I hired a small flat scow, at the low price of \$1.50 per day and built a shanty on it which provided living quarters for my party. We tied up at various points around the bay so as to always be near our work. Whenever we wished to shift our position it was done by the small steam tug Maggie Carroll for which I paid the princely sum of \$2.50 per hour. The owner of this tug was Matthew Carroll, member of the village Council. I mention some of these prices so that the reader can compare them with prices now current. Some of our supplies were bought of H W Pearson who was then in the hardware business and later achieved reputation as a scientific investigator and theorist. Lumber was bought of Dailey & Heimbach, and other firms. In Superior, Denis Dean, Peter Bradshaw and other well known merchants and citizens sold us supplies. West Superior was then just being laid out and started, with Gen. J H Hammond and F J Wemyss among the leading managers of the new townsite.

As a starting point for my surveys I made use of the old Lake Survey base line on Minnesota Point. It has a length of about 3½ miles in a straight course which had been cleared of trees and bushes, and has permanent markings at each end. This base line was first measured by under the direction of Captain George G Meade, with wooden rods, as a secondary base, in 1861. This was just before he was called to the front in the Civil War. He was later General Meade in command of the Union forces at the historic battle of Gettysburg. This line was re-measured in 1870 as a primary base line with refined methods and great precision by Gen. C B Comstock and his assistants

From this base I established a number of points on land around Superior Bay by a system of triangulation, and from these stations by means of two transits the soundings were located, but at the Duluth basin a system of ranges and cross ranges were used which avoided the use of transits. The base line seemed a godsend to me at that time. It is and always will be a valuable asset to the harbor, insuring definite and exact reference points for surveys and by which different surveys can be compared. The present observation towers, one at each end of the base line were built by the writer in 1895

One of my assistants of the surveys was W B Silvey, who later was engaged in real estate and other business activities in Duluth. He was one of the victims of the Titanic disaster of April 14 1912 when 1517 persons lost their lives. Another assistant was Thomas McMath, now a prominent civil engineer of Indianapolis. Geo B Worley was another, now a civil engineer of Seattle, also D W Kinnaird, of whom I have now lost track. John Jibaway of Superior was leadsman, and a good leadsman too. Then there was Francis C McMath, a young man who rowed boat for me in taking some of the soundings. He is now president of the Canadian Bridge Co. of Walkerville, Ontario, a company that took part in the construction of the great Quebec cantilever bridge over the St Lawrence River, recent-

ly completed. I certainly had some bright young men in my survey party! Among my inspectors of dredging in 1884-85 were Mr Silvey and Mr Kinnaird already mentioned, and Julius D Howard, son of U S Senator Howard. Julius was afterwards Duluth Postmaster, also member of the real estate firm of J D Howard & Co. William C Howenstine whose home was on Minnesota Point opposite Superior served as Assistant Inspector on the Superior dredging and assisted me in various other ways

It was not as easy getting around then as now, either on land or water. Duluth had a short street car line on Superior St with bob-tail cars drawn by horses or mules. I found it quite a walk down Lake Avenue to the Canal and a still longer walk from Superior St down Garfield Ave (then called Third Street) to the end of Rices Point. Charles Winter ferried people across the Duluth Canal in a large flat row boat. When the ice was running in large cakes the boatman's task was not an easy one. It was like Washington crossing the Delaware. There was a wooden tower standing on the north side of the Canal which was said to be part of a former suspension bridge over the Canal for foot passengers and used only in the winter. In summer the bridge was taken down, being too low for vessels to pass under it. It is said this bridge was unsatisfactory on account of unstability in a wind, and I believe it did not remain long in commission

The steam ferries Mary Martini, Hattie Lloyd, and Captain J J Hibbard's sidewheel steamer Free Trade carried passengers between Duluth and Superior in the summer season. No bridges had been built, either railway or highway at that time, in 1884. In winter the ice was used for crossing the Bay with teams and on foot. In spring when the ice softened this kind of traveling became dangerous. Teams would break through and ~~are~~ drown, and persons walking also would break through. Many are the tales I have heard old settlers relate of their struggling alone in the cold water for a quarter of an hour, more or less, while trying to crawl out upon the solid ice but which would keep breaking off in pieces under

them.

In the winter of 1884-85 Mr Shaw of Superior drove a stage between the two cities by way of Rices Point and over the ice. When riding with him I remember hearing him tell of taking snowshoe journeys from Superior to Bayfield in the winter when there was no other means of travel, and his only food on the way was mince pie. His wife would bake up a number of these pies and put them in a pillow case together and he would take the bag out doors and swing it against the side of the house to make a compact mass of the contents. In this bag he and his companions had a menu of meat, fruit, pastry and I dont know what else, all in a one-course dinner

During the winter of 1884-85 the Northern Pacific Ry Co. built its bridge across St Louis Bay from Rices Point to the Wisconsin shore at West Superior, this being the first bridge to ~~XXXX~~ span the waters of the harbor. This was built under an act of Congress and in accordance with plans approved by the War department. The inspection of the construction on behalf of the Government was my duty. The bridge engineer for the ~~ex~~ company was Alfred Noble, and his assistant ~~was~~ Mr E H Beckler was in local charge of the work. Mr Noble had been in government employ for a number of years previously and was the builder of the first government lock at the Soo known as the Weitzel lock. He afterwards in private practice did a great deal of important work in various parts of the country and achieved high distinction as a civil engineer

The coldest weather I have met in Duluth welcomed me in the first winter that I was here. On Jan 2 1885, 7 30 A M I noted 38 degrees below zero at my boarding place near the Canal. One day when it was 26 below at 8 A M I started out in the forenoon on the ice to take some measurements with a transit but the telescope turned so hard that I could do nothing with it. I believe this was due to the contraction of a brass socket bearing upon a steel spindle, as brass expands and contracts about twice as much as steel. One morning in January I was taking some soundings with

Thomas McMath assisting me, in the harbor just inside the inner end of the Canal where the ice had formed during the night $1\frac{1}{2}$ inches thick. This was as a spot where currents caused some shoaling and I wished to examine it. It was risky business walking on so thin ice but I wanted the soundings pretty badly and we got them. I would not take such chances again. It was here that I first met Captain Alex McDougall, that staunch friend of Duluth and tireless worker for the advancement of its commercial interests. He happened to come down where we were at work, introduced himself and showed an interest in the harbor improvements. He has always been a good friend to me

In the spring of 1885 I saw the rare occurrence of an island moving away from its original natural location in the northerly portion of Superior Bay and ~~drifting~~ ^{drifting} towards the Duluth & Canal, carried along by a field of ice. This was in the afternoon of April 23rd. It was a real island, covered by bushes and small trees, which I had located and mapped in the fall of 1884. Next morning the floating island was near the Lake Avenue Slip and later in the day at the outer end of the Canal. The passage of this novel craft out through the Canal was three days ~~ago~~ ahead of the steamer R G Stewart which made her first trip to Two Harbors on the 27th, and yet it was not officially ~~not~~ recorded as the first departure for the season

This island was the last one of a group of several islands that were in the Bay in former years, as shown on several old maps, at the time when the north end of the Bay was quiet water. The building of the Duluth Canal about the year 1871 turned the St Louis River current in that direction ^{and} undoubtedly undermined the islands, which probably had a soft bottom and the force of floating ice fields finally displaced them. I do not now find the map in the office files on which I plotted this single lone island, but have an impression that it was about two hundred feet in ~~its~~ diameter

In the fall of 1885 there was fine mild weather late in the sea-

son. Edward McCue, a well known contractor, was then engaged in placing riprap at the base of the Superior Entry piers under my direction, loading boulders on a scow from the ~~St~~ Endion shore at Duluth and towing the scow through the lake to the Entry. The weather was so calm and fine that the work was continued up to and including December 3rd. Then on Dec 4 it turned cold and ~~a~~ stormy and winter set in with a blizzard

Sept 21 1886 is the date when the harbors of Duluth and Superior and the north shore of Lake Superior were separated from the St Paul District and formed a new one called the Duluth District, with Captain James B Quinn assigned to its charge. The ~~&~~ south shore harbors of Lake Superior were added to the Duluth District in 1888 by transfer from the Milwaukee District, so that it then included the entire American portion of Lake Superior and the streams ~~sa~~ that flowed into it. There are ten harbors in this portion. During the present year (1919) the Lake of the Woods, Minnesota, has been transferred from the St Paul District to the Duluth District. It includes the harbor of Warroad which ~~has~~ has been under government improvement. So the Duluth District has grown by accessions from time to time to what it now is. At least one thing is yet lacking in my opinion and in the opinion of others: Lake Superior should be detached from the Eleventh Light House District and established as an additional district with headquarters at Duluth and placed under charge of the District Engineer. The lake is large, its harbors and channels have multiplied and its commerce increased so greatly, and the present headquarters at Detroit is so far distant from this body of water, that such a change would appear advisable. This has been strongly advocated by our townsman Captain McDougall

The harbors of Duluth and Superior were considered as separate ~~&~~ harbors previous to 1896, but by the river and harbor act of June 3 1896 these two harbors were combined in one item and since that time have been considered and treated as a single harbor for purposes of government im-

provement. The official name given in the river and harbor bills is, Harbor at Duluth, Minn. and Superior, Wis., but this is usually shortened to simply Duluth-Superior Harbor. I will here indulge in a few figures, just a few, to show the immense growth in the commerce of this harbor during the time I have lived here. In 1884, the year I came, the amount of freight received and shipped by lake at Duluth and Superior was 954,454 short tons, or less than a million tons. In 1918 it amounted to no less than 53,746,358 tons, more than 56 times that of 1884, and the value of the 1918 commerce was \$537,514,906. In amount of tons of freight it is believed that the commerce of this harbor is second only to that of New York of all the ports of the world. Its unit value however is rather low, averaging ~~at~~ \$10 per ton, owing to the large proportion of iron ore. According to a comparison which I made in 1912 the value of the commerce of this harbor is exceeded in this country by New York, Philadelphia, and by ~~San Francisco~~ San Francisco and Oakland considered as a single harbor, and by the foreign ports of London, Liverpool, Hamburg, Antwerp and Rotterdam

My employment as Assistant Engineer in this district continued
 1884
 for 29 years, that is from ~~1883~~ to 1913. The district during this time ~~was~~ was always under the charge of an officer of the Corps of Engineers, U. S. A. These were usually changed about every four years. They came and went while the Assistants remained on the work. My duties had to do with all the harbors at one time or another. During the last sixteen years of that time my position and title was that of Principal Assistant Engineer

The improvement of these harbors has consisted of the construction of breakwaters, of revetment piers or jetties for the protection of the sides of entrance channels, dredging of channels and anchorage basins, the rectification of the channels of the St Louis River through the flats above Cassy Point, the establishment of harbor lines, examinations and surveys preliminary to improvements, the determination of compass variation or magnetic declination on both land and water, the supervision of



construction over navigable waters, the construction of vessels for use on engineering works, the removal of wrecks, the construction of buildings etc. Much of the foregoing work was designed and executed by the writer.

One dredging ~~job~~ contract amounted to 21½ cubic yards of ~~excavated~~ excavated material. Other jobs of considerable size were the improvement of the entrances to Duluth-Superior harbor, and the breakwaters constructed at several of the harbors of this district. The magnetic work mentioned included a large number of observations of the sun with a U S Navy standard compass and azimuth circle, aboard the U S steamer Vidette in 1902 and some of the following years, over portions of Lake Superior, to determine compass variation for the use of navigators in computing compass courses and to discover localities affected by local attraction or disturbance of the compass. This magnetic work was outside the usual lines of engineering operations, and the greater part of the expense was paid from Lake Survey funds, and the results were published by the Lake Survey. This work flavored strongly of astronomy and was very interesting to me. Mr Clell D Hibbard, son of Captain J J Hibbard, assisted me on this work

During the removal of a wreck I did some exploring under water in John Wanless' diving suit. The sensations while in the suit were peculiar and not exactly pleasant. I was'nt used to it. It gave me some new experience however. A slightly different experience from this was that of Mr ED H Spalding when he was Inspector for the government on the Fraker ^{Bros'} ~~Bros'~~ contract of riprapping the base of the Superior Entry piers with large pieces of granite rock from the north shore. Spalding was a careful and industrious inspector. One day ^{as} he was standing on the edge of the contractors' scow taking soundings for directing the placing of the pieces, a fall chain that was swinging from one of the derricks struck him in the back and knocked him into the water. As he came to the surface and was pulled out of the water the foreman remarked, "So, Mr Spalding you thought you would go down below to inspect the rock!"

On the 24th of July 1913 I indulged in the unusual luxury of a trip in an airplane. For some time I had wanted to do this. In my boyhood ~~days~~ dreams I had often, very many times, flown through the air, and this apparently by a kind of mental effort rather than by any mechanical means. My opportunity for a real flight came when Tony Jannus was here giving exhibition flights and was coaching Mr W D Jones in the art who had bought a machine from a St Louis firm which made them, and of which firm Jannus was a member. I had watched from my office window the flights Jannus had been making over the harbor. He indulged in no difficult or dangerous stunts, seemed to be very careful and I concluded that a trip with him was a pretty safe proposition. It was a bi-plane, starting from and lighting in the water, and called a hydroplane or flying boat. Selecting a fine day I stepped into the craft at the Boat Club without fear. We rose from the water and went southward down the Bay, flying directly over a dredge that was doing government work. The dredgemen recognized me and waved their hands. A reporter in writing it up declared that this was a new method of inspecting government work that I had adopted. We rose to only a very moderate height yet as we passed over Minnesota Point the Oatka tennis court and the streets looked like a map beneath me. We continued over the lake and headed for the Canal. The engine made so much noise I could not talk with the aviator. As we neared the Canal he shut off the gas and we made a dive, which startled me just a little, and we passed in ~~front~~ front of the Engineer office and under the aerial bridge. After making some circles over the harbor we came down to the water gently and gracefully and sailed to the Boat Club. We were in the air about fifteen minutes.

Of all the means of transportation I have made use of in the course of my life, from a sled, skating, swimming, rowing, horseback, wagon, steamboat, railroad, bicycle, automobile, to the flying machine, the last named was the most novel and thrilling, and the trip I took on that July day was the most enjoyable for the time it lasted of any journey I

have ever made

Before leaving the subject of harbor work in our district I will mention a rather interesting comparison of the cost of harbor improvements with the value of the commerce that is aided thereby. The last published annual report states that the total amount expended by the United States for improvements and maintenance in the Duluth District up to June 30 1918 was \$13,027,093. Also the total ~~commerce~~ vessel commerce in this district to Dec 31 1917 as 1,066,917,695 tons of 2000 pounds, and its estimated value as \$9,276,639,467. This last figure of nine billions and some dollars sounds like a war cost. It also reminds me of the dimensions of the solar system, and is three times as many dollars as the number of miles from the earth to the most distant planet, Neptune. But what I wish to call attention to is the fact that the sum expended by the government on improvements and maintenance in this district is only one seventh of one per cent of the value of the commerce benefitted.

Looking at this in another way, it figures out that the amount expended by the government averages only $1\frac{1}{2}$ cents per ton of the freight carried. Comparing this by way of contrast with the lower and middle portions of the Mississippi River I have seen it stated that the cost of improvement and maintenance there has been something like 3 or 4 dollars for each ton of freight carried.

Trip to Panama. Always fond of travel I occasionally made use of the 30-days vacation to which I was annually entitled by taking a trip with my wife during the winter season when I could best leave my work. In this way we visited some of the eastern cities, the southern states, Cuba and the Pacific coast. In ~~February~~ and March 1911 we joined a party of engineers, members of the American Society of Civil Engineers and their families, in a trip to Panama. The great canal was then under construction and we had a rare opportunity for inspecting all phases of ~~the~~ the work through the courtesy of the Government engineers in charge. I will here quote from some notes which I contributed to the Duluth Herald and

were printed in the issue of March 25 1911

The Panama Canal is a work so large and spectacular that all eyes are turned toward it and many tourists are visiting the isthmus to see it. More would go if they knew how delightful it is there at this season, and how easy it is to get there provided you have the money. The engineering profession is especially attracted to this spot, with a desire to see at close range how the work is being done. The American Society of Civil Engineers has just made a visit of inspection and it was my good fortune to join the party, consisting of about 120 members. Many of them were accompanied by their wives, and ladies climbed around the locks and dams like engineers.

We were met at Colon by members of the canal commission who took us in charge and had a program prepared for our week's stay in the isthmus, and each day conducted the party over portions of the work, until all the principal features had been seen.

The first day was spent at the Central Division, of which the celebrated Culebra cut was the chief attraction, and throughout its nine miles was a very busy spot. Col. Gaillard is the engineer in charge of this division and was our guide in looking it over. He will be remembered by many Duluthians as the officer in charge of harbor improvements on the Lake Superior district for two years, 1901 to 1903, with his office at Duluth. He takes much interest in this district and inquired particularly regarding Duluth-Superior harbor and the people of our cities.

In common with many others I was anxious to know whether this big undertaking for which the people of the United States will have to stand the cost of nearly \$400,000,000 was being carried out in a business-like manner and with due regard to economy. Generally speaking I believe it is so conducted at present. The officers and civilian engineers and administrators in charge of the work appear to me like competent and energetic and honest men. I am sure this is true as to Col. Gaillard, from my association with him in Duluth. At Panama he is keeping up his reputation for hard and effective work, and in my opinion no better could be found in the whole country for the position he now fills.

He gives the work close personal attention, without an assistant, being on the ground the first half of each day and giving orders directly to his superintendents and foremen. In the afternoon he is in his office at Empire, and signs about 150 papers each day. He has at work in the Culebra cut 46 steam shovels, 155 large locomotives, rock and earth trains of twenty cars each, the most approved and rapid unloaders and spreaders and track shifters, and the work is systematized so that it moves along like one great machine. He is taking out during the present dry season an average of 71,000 cubic yards a day, place measurement, and made a record of 80,000 March 11 while our party was on the isthmus. The material is stated to be 70 per cent rock or other hard material requiring blasting or loosening up so that it can be handled by the steam shovels. These shovels pick up very large pieces of rock and place them on the car with remarkable skill, balancing the piece on top of the shovel and rolling it off on the flat car in a way that brought out cheers from the visitors who were watching the operation. It was stated by Col. Gaillard that he had seen a 22-ton piece handled by the shovel in the same way.

During the rainy season, from May to December, the

floods of water hinder the work considerably and the average output from the Culebra cut is less, or about 61,000 yards per day. The average length of haul to the dumps is twelve miles. The total cost of rock and earth excavation including cost of plant and administration is stated to be now about 64 cents per yard in the Culebra cut, as against the estimated cost of \$1. T This is a creditable showing, and this reduction in cost will more than pay for removing the earth which ~~has~~ has been sliding into the canal in large quantities during the last two years and for that which is to slide in hereafter.

* * * * *

Each member of the party was presented with a cane, made from the original ties of the Panama railroad which had been in place about fifty-eight years. They are of lignum vitae wood, and make an interesting relic. The road was built in the early '50s of last century, when the isthmus was very unhealthy, and each tie of the road is said to have cost a human life.

Our steamer on the journey to Panama was the Parismina of the United Fruit Co line. We sailed from New Orleans March 1, the day following the Mardi Gras carnival which we had attended. While in New Orleans I called to see Captain Ray T Lewis, former mayor of Duluth, who was then sick in bed at a hospital. He seemed quite strong, talked freely and we had a good visit. Also met his son Fred Lewis who was in business in that city.

Our voyage over the Gulf of Mexico was a delightful one. Weather calm and the water almost as smooth as a mill pond. Flying fish were numerous, and very interesting animals. I watched them closely from the bow of the vessel as they darted up out of the water and flew in various directions trying to escape from the vessel. They were about six inches long, have two pairs of wings, light and transparent, and it made the fish look something like a large insect. These wings are really a development or extension of the fins. I noticed that the wings were not in motion like those of a bird, when flying, and suspected that the fish was propelled through the air by its tail and that the wings served for gliding through the air the same as an airplane does. They swam very rapidly before coming out of the water, and flew just a little above the surface to distances of perhaps 50 to 300 feet before dropping into the water again. They have a dark back and a light colored belly. I have just been reading about the flying fish and find that I

was not quite right about their method of propulsion through the air, as it is not by the action of the tail while in the air but it seems that they get a start in the water, swimming with their tail, and so rapidly that when they leave the water the velocity is sufficient for them to glide for a considerable distance. It is also stated that when in the water their wings are folded close to the body and the swimming is done entirely by the tail, and then on leaving the water the wings are spread and the tail ceases to act.

While in the Carribean Sea I had some fine views of the stars and planets. Venus and Saturn were in view and seemed very bright, probably because they were higher up in the sky in the southern latitudes. Also had a good view of the zodiacal light, and of the stars of the Southern Cross. The latter was disappointing. It did not seem to me nearly as fine a cross as the Northern Cross, sometimes called the Great Cross in Cygnus, with which we northern people are familiar.

Costa Rica. Our steamer stopped at the port of Limon, Costa Rica, for the purpose of taking on a cargo of bananas, and as it remained there two days and one night we had time to take a railroad trip back into the country to the capital, San Jose, 103 miles distant. There were 23 of our steamer party that took this trip and it proved to be well worth while, as we passed through fine scenery and met things that were new to us. First were large banana plantations with bunches of fruit on the high stalks and heaps of the fruit at the side of the track waiting for shipment. The plantations were confined to the low lying, warm and damp lands near the coast, and here the bananas grew in great profusion. Farther in the interior were coffee plantations. Various other tropical fruits are raised. The finest pineapples I ever tasted were brought to the train by natives and sold to the passengers at a moderate price.

The ~~hankixxxx~~ interior of the country is elevated and mountainous. We saw several peaks, and one that was said to be a volcano

although it did not appear to be active. We passed through the city of Cartago which was wrecked by an earthquake ten months before and several hundred of the inhabitants killed. A heap of brick and stone at the side of the track was all that remained of a cathedral. The conductor told it took a day or more to clear away the wreckage so that his train could pass.

One thing I noticed as we passed through the country, that the mountains seemed to be covered with a growth of trees or bushes clear to their summits, although probably six to ten thousand feet high. This was a remarkable contrast to the bare rocks of the Rocky Mountains in our western states and Canada. San Jose, the capital, with thirty four thousand people has some very fine public buildings, including an opera house which is said cost about two million dollars. The hotels however were much behind the times, with scantily furnished and uncomfortable rooms, and the food we could hardly eat at all. We were not used to their cooking. We stopped at what was said to be the best hotel too. That part of the country is about four thousand feet above the sea and the climate is quite cool. I had to wear my overcoat in the evening. At Limon, on the coast, we found it too warm for comfort.

Retirement. My retirement from government work was partly on account of my health. I found that my work, and the worry connected with it, had begun to affect my nerves. Loss of sleep and of appetite and a kind of melancholy, at times, gave warning of a possible breakdown. With this was a desire I had long felt for an opportunity to indulge in scientific study and in travel more than my engineering work could permit. I therefore resigned, and my service terminated with the close of October 1913. It was with very gratifying expressions of friendship and good wishes on the part of my associates that I took my departure from the Engineer Office. The Duluth Herald of Nov 1 1913 contained an appreciative notice of the occasion and I will quote a portion of it here.

John H. Darling, principal assistant engineer in the United States engineering office in Duluth, stepped out of har-

ness yesterday, having a few weeks ago handed in his resignation to become effective at the end of October. Mr Darling has just completed forty years of service in the government employ and is recognized throughout the country as one of the leading authorities in many matters connected with government engineering work.

On the occasion of his leaving active service yesterday his fellow workers in the engineers' office presented him with a handsome silver loving cup, appropriately engraved, and all of them made addresses in which the retiring engineer was offered the best of wishes for his future. Clarence Coleman made the presentation speech and took occasion to thank Mr Darling for the assistance he has given each one of his fellow workers by his ripe advice and the influence he has exercised on the lives of each. During the address Mr Coleman referred to Mr Darling as "the dean of engineers of the Great Lakes."

In his resignation Mr Darling says that as he has reached the age of 66 years and has served the government for forty years, he now wishes to indulge himself to some extent in the way of favorite study and of travel, both in America and abroad. In fact Mr and Mrs Darling expect to go to Europe before very long but are not yet prepared to announce just when.

In his acceptance of the resignation, Capt. E D Peek, engineer in charge, expressed the deepest regret at the determination of Mr Darling to withdraw from the service. In the letter Capt. Peek says:

"Your services to this department for the past forty years have been of more than ordinary value and satisfaction to all who have been fortunate enough to have had occasion to intrust work in your charge."

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EUROPEAN TRIP IN 1914

In 1914 my wife and I spent six months in Europe. This will be remembered as the year of the beginning of the great war. Fortunately the first three months of our stay in Europe were spent in Italy, Switzerland and Germany, prior to the outbreak, which countries could not have been visited by us later in the season. The last three months were spent partly in Scandinavia which was neutral and safe, and in Scotland and England where the local conditions seemed but little affected by the continental strife, and where a tourist could feel at ease, for the first few months at least

The war prevented a visit to France, Belgium and Holland, and also caused the cancellation of a cruise to Spitz^ebergen and North Cape, - the "land of the midnight sun", and the rugged and picturesque Norwegian coast, for which we had ~~previously~~ secured reservations some months before while in Rome and which I looked forward to with eager anticipation. War was declared two days before the steamer was to sail from Amsterdam on this cruise, and as the vessel, the Thalia, was of Austrian ownership and liable to seizure by the allies it wisely decided to remain in that neutral port

Before leaving New York I called at the Russian Consulate to get my passport vised (indorsed) which was necessary in case we wished to extend our travels into Russia. I remember I had to fill out a blank form of questions, and one question was What is your religion? My reply was, I have no religion. When the official saw this he told me with some impatience that such an answer would not do and that I must state some kind of religion or he would not vise my passport. A little further consideration led me to conclude that all he wanted was to know whether I was a Jew or not. As I was living in a country that was largely Protestant I wrote Protestant for an answer. This would apply to my wife at least. He then made an indorsement, in the Russian language which I could not

read and never knew just what it said

We sailed from New York for Naples April 16 on the steamer Canada of the Fabre Line (French). It was not as large or as fast as some of the Atlantic liners but was nicely furnished and decorated, comfortable, the table and service were excellent, and everything as good as any but a millionaire might wish

While passing through the Ambrose Channel outside New York harbor we saw two U S battleships steaming southward, said to be the Louisiana and the New Jersey, headed for Mexico. This was at the time when our government was having trouble with Huerta. During our trip over we received wireless news of events in America. On April 23rd a message told of the capture of the Mexican seaport of Vera Cruz by our fleet, and of arrangements made for the mobilization of 250,000 men of the National Guard. "I greatly regret this action" is noted in my diary. Dr Anna H Shaw who was a fellow passenger remarked, "They ought to be ashamed of themselves", referring to our government

The passengers were entertained evenings occasionally by moving pictures and with music by the "Canada Orchestra". One evening a very nice concert was given, gotten up by the passengers, with vocal solos, patriotic songs, piano solos, and an address on the Panama Canal by a gentleman from Providence. I had visited Panama myself and was interested in what this person might have to say about it. He gave about one minute to Panama and the rest of his address to jokes and funny stories. Dr Anna H Shaw gave an address one evening in the drawing room on woman suffrage, her favorite topic. It was a strong discourse and effectively delivered. An animated discussion followed her address, which was continued 1½ or 2 hours in the same room by several groups of passengers

Algiers. The first city we visited in Europe was in Africa, as Paddy might put it. I am part Irish myself. We had passed the Azores and Gibraltar without stopping and our first landing was at the French city of Algiers in northern Africa where we spent a day. We were pleased

at this for the city was well worth seeing. It is about the size of Cleveland. It is French for the greater part with fine modern buildings, streets and parks, and the other part Moorish with peculiar living and business quarters, shops and mosques, - the remains of its former nationality. This was a very closely built up section and congested, with narrow passages for streets. The contrast between their part of the city and that of the French was remarkable. There was a well protected harbor but small for the size of the city and the amount of its commerce. A boat club building looked quite modern. A notice on a bulletin board gave instructions as to the admission of guests to meals. There were parks in the city with a profusion of semi-tropical plants and trees

Naples and Vesuvius. As our vessel approached Naples early in the morning of April 29 1914 we had a ~~fine~~ fine view of this noted volcano which stands about ten miles southeast of the city. At this time we were probably about 15 miles from the volcano and were heading directly for it and running nearly due east. The wheelsman must have been using the peak for a landmark to steer by. The dark outline of the mountain was projected against the bright morning sky. A large column of what seemed to be black smoke, of irregular form, was rising from the summit of the mountain vertically to a height of probably a mile and then it turned abruptly off to the right and floated away in a horizontal line to the south as far as I could see. This was my first view of a live volcano and for me it was a most impressive sight. As we were watching it the sun began to rise, first appearing like a bright star at the bottom of a notch at the left of the crater, and this added to the beauty of the scene

Naples is Italy's largest city, with 723,000 people in 1911. It is finely situated on a beautiful bay, has a delightful climate and fertile lands around it. A great variety of crops and fruits are raised but it is not quite warm enough for raising oranges

It is an easy matter to visit the summit of Vesuvius, by a trol-

ley line and a cable railway, and I made the trip twice. The road starts from the base of the mountain as an electric line with easy grades running through gardens and vineyards then coming to a steeper grade our car was pushed by a small electric locomotive which engaged a center rail rack. Next was a stretch which our car made without the pusher. Finally we changed to a steep cable line which took us to within 100 feet of the elevation of the crater and we walked up to the rim of the crater. Some years ago a cable line ran clear up to the rim but this line was destroyed by an eruption and was rebuilt in a different location and stopped farther away from the danger point. The crater was filled with steam while I was there which rose in the form of a large column. Standing on the narrow rim I could look down to a depth of 50 or 100 feet but could not see the bottom nor could I see across to the other side of the crater on account of the steam. The rim was composed of volcanic ashes which looked like sand or silt, loose and rather light colored. Some of it seemed to be granulated lava. There were a few small stones in it like trap rock

The upper portion of the mountain was bare, consisting mostly of volcanic ashes, and in places with large areas of dark colored hard rock which was the lava which had run down like a river of molten matter at the time of some of its numerous eruptions and had cooled. The lower portion of the mountain sides was covered with vegetation: fruit and various crops, growing luxuriantly on the old volcanic ashes which is a fertile material

Amalfi Drive. This fine drive along the bay of Salerno is a roadway about 35 miles long and for nearly the entire distance it is cut into the side of the steep mountain slope of volcanic rock, at varying heights of 100 feet or less to 500 feet above the sea. It winds in and out along the bluffs and crosses ravines by masonry viaducts and at one place it runs through a short tunnel. The roadway is rather narrow,

with a macadam surface. The outer portion is supported by a retaining wall which in some places is of considerable height and is surmounted by a continuous masonry parapet about three feet high. It is a costly road and I could not see how the traffic of the meagre population along the route could warrant the outlay. The drive however is an attraction for tourists and the money spent by tourists forms a large part of the revenue of the country, in the way of hotel bills, purchases, railroad and auto fares, sight-seeing fees, etc, so that it is a wise policy of the government and the municipalities to encourage the tourist business by providing as many attractions as possible

Truck Carts. Hauling of freight through the streets of Naples was by a two-wheel cart drawn by three animals. The largest one of these which is often an ox or a cow is put in the middle between the long thills for balancing the load as well as for pulling. The other two are hitched at the sides for pulling only. Sometimes one of these is a small horse and the other a donkey. It was a strange combination for a team, in the eyes of a foreign visitor, and looked very comical. I did not see these carts except in Naples. Northern Italy is more modern in its methods

Street Railway. There is an electric system in Naples but it was tied up by a strike while we were there. You cant get away from strikes by fleeing to another country. For getting about the city a one-horse taxicab was generally used. These were very numerous and there was almost always one within hailing distance. The price for two or three persons was from six cents up according to the distance, and the driver expected a tip in addition. The cab horses were all stallions, mostly of bay color and were of small size compared with American horses. In Rome the prices on the electric car lines were one cent and up according to the distance. The cars were smaller than ours. I was pleased to see that they were equipped with the Thomson-Houston system of control, made in America.

Pompeii. About 15 miles to the ^usouth-east of Naples and near the foot of Vesuvius are the famous remains of this ancient city which at about the time of Christ was a suburb of Naples and the residence of wealthy Romans. An eruption of Vesuvius in the year 79 (1840 years ago) buried the city in ashes. These ashes have been excavated and removed from a large part of the city in recent times. The buildings and their contents were found to be quite well preserved by the ashes, and an inspection and study of these remains give much information as to the domestic life of ~~the~~ its former inhabitants. Many relics from Pompeii are preserved in the National Museum at Naples, and many of the buildings are still standing on the site

I visited an extinct volcano called Solfatara, six miles west of Naples and walked over the floor of it which had considerable heat remaining and steam was issuing in several places. It is a flat floor about one-fourth mile across, inclosed by a circular wall, something like the craters on the moon but not as large or as deep. I saw another crater in which the bottom was covered with water forming a lake

The San Carlo theater is a large fine building where many great operas have been produced. Its seating arrangement is quite similar to that of the New York Metropolitan, but it has six galleries while the Metropolitan I believe has five. The opera season was not on at that time but I attended a piano recital which was given by the well known artist Moritz Rosenthal. He is a strong and finished player, a master of the piano, and gave a fine program which included the Chopin Sonata Op 58 and R Schumann's Studiï Sinfonici Op 13. People were well dressed but no full dress. During intermissions the people on the main floor were very sociable and ~~unconventional~~ unconventional, some of the gentlemen putting on their hats as they chatted with their neighbors, and standing up in the aisles. The performance was announced for the hour of 21 30 (9 30 P M) but began at 9 45 and lasted until 11 55 including three encores after the close of the program.

I visited the Royal Observatory and was shown through it by an attendant who could not speak English, but we managed to understand each other pretty well with the aid of signs. The observatory is well equipped with instruments for various purposes of astronomical research, but with no very large telescope. There was a large library which included American astronomical publications. Had a grand view of the city and surroundings from the roof of the observatory about 5 P M. Noticed that both smoke and steam were arising from the crater of Vesuvius

The National Museum contains a wonderful collection of Pompeian relics which give a pretty good idea of Roman habits and customs ~~maxis~~ at the time of the destruction of the city in A D 79. The statues found in the houses, of bronze and marble, were made not by Romans but by Grecians who were better artists and so were employed for that purpose. These statues portray many of the Roman people of the upper and wealthy class. The ornamental statues and mural paintings in those ancient residences indicate the tastes of their owners which ran largely to voluptuous luxury and cruel sports. When we were visiting the ruins at the site the gentlemen of the party were shown an example of a ~~xx~~ "red-light" building with very striking mural paintings within its rooms

Farming Country. On the journey of 155 miles from Naples to Rome we passed through a fertile and highly cultivated country, with crops of various kinds, men and women hard at work together hoeing corn etc and too busy to stop and look at our passing express train. The scenery was varied with trees, flowers, hills and mountains, old castles and other ruins, cities and villages old and new, country houses which were generally substantial, and fine roads. It looked like one great magnificent park

The railways we passed over had good smooth tracks and made good time. Compartment cars were used, of several classes and prices. Meals in dining cars were served table d'hote and were plainer and less expensive than on our American lines. These remarks apply in a general way to

the other European railways which we patronized

Rome. This city has fine parks, famous churches, some good museums and monuments, but rather inferior public buildings. Its chief distinction consists in the remains of the ancient city of the same name with its marks of Roman civilization. During subsequent centuries much of the material of the Roman edifices was used for building churches and other modern structures, everybody helping himself, but now what remains is carefully preserved by the state and municipal authorities on account of its great historic value and for an attraction to tourists. We spent three weeks in the city, visited the points of interest with the aid of guides, and made an excursion to Tivoli the beautiful ~~suburban~~ suburban resort twenty miles east of the city. Near Tivoli we visited the ruins of the Villa of Hadrian which extend over an area of 170 acres. This villa built by the Roman emperor Hadrian was, it is said, "one of the most magnificent creations of the imperial age. It contained both architectural and realistic imitations of the buildings and places which had most interested the the emperor in the course of prolonged travels throughout his vast empire." Judging from descriptions and the present remains it seems that the emperor ~~xxx~~ to gratify a sort of whim undertook to build a small model city without regard to expense which would surpass everything then existing in the way of beauty, elegance, comfort and luxury

The Colosseum is an immense ruins, well shown by views with which most are familiar. Large as the ruins are they are only one third of the original structure, so much of it has disappeared. For a time it was used for a stone quarry. It was an amphitheatre 615 feet in its longest diameter, had seats for 40,000 to 50,000 and would hold 87,000 persons. It was used for combats of gladiators, who fought to the death, and for the killing of wild animals, something similar I suppose to the bull fights of the present day in Spain and Mexico, all for the amusement of the Roman populace. It was with a painful feeling that I looked at this place which had been the scene of so much cruelty. Shortly afterwards

I stepped into one of the large hotels to see a friend, and while I was in the lobby I noticed a contribution box attached to the wall with words soliciting money for the support of an Italian humane society. I was very glad to see that box for it told of a spirit of kindness which I believe is growing in the minds of civilized people in recent times, more particularly in the United States and England, and gradually replacing the brutal instincts of former centuries. There were 558 active anti-cruelty societies in the United States in 1914, 49 of these being added that year

At Rome we at first stopped for a day at the Boston, an excellent hotel, while we took time to look up a less expensive pension. A pension is something like a hotel without a lobby, and on the American plan. The one we selected, the Cargill, had a large patronage of tourists and we met some nice people. I found it cost my wife and me each \$1.95 per day for room and board and extras, including laundry, baths, wine or beer at lunch and dinner, tips, and moving trunks

Florence. This was the next city on our tour. We were independent of any party, going where we chose and ~~staying~~ staying as long in any place as we pleased. But from the time we left Rome we followed a pretty definite route and schedule which we planned to bring us to the harbor of Gudvangen, Norway, so as to meet a vessel there, - the steamer Thalia, on Aug 6 for a ~~special~~ "polar cruise". I reserved a stateroom for this cruise while in Rome. At Florence, which the Italians call ~~Firenze~~ Firenze, we spent 7 days. It is a fine city in northern Italy and is noted chiefly for its art galleries. Its collections of ~~painting~~ paintings and statuary are I believe the finest in the world. The best of these collections are in the famous Uffizzi Gallery and the Pitti Gallery. Of course we spent considerable time in looking at the great works of art stored in these large buildings. The National Museum also has a very fine collection, especially of bronzes and of marble sculptures.

The Pitti Gallery is a portion of the Pitti Palace which has for four or five hundred years been the residence of nobility who were the rulers of the city. Its apartments which are open to visitors are the most richly furnished of any palace I have seen

The church of the Holy Cross seems to be used mainly as a mausoleum for distinguished Italians and contains tombs and memorials of highly artistic design. Among the famous characters there honored I saw the names of Michael Angelo the architect and painter, Dante the poet, Rossini and Cherubini the composers, and Galileo the first astronomer that used a telescope. There is a particularly fine drive on the south side of the city which leads through ornamental parks and grounds to the heights called the Michael Angelo Square where there is a fine view of the city

We stayed at the pension Luchesi, a very satisfactory boarding place on the right bank of the Arno River and convenient to the city. Price of board and room was \$1.50 each and extras brought the cost up to \$1.86. We found a lot of nice people there and made pleasant acquaintances among them. We attended the Alfieri Theater and heard the opera Barber of Seville. It was said to be given by local talent and if so it was remarkably well performed

Venice. Taking a room at a pension we found Col G D Fitch and family staying there. He will be remembered by Duluth people as the officer in charge of the Duluth engineering district for a few years. This was a pleasant meeting for us. The pension was located on the Grand Canal. The next day after our arrival there was a strike on by the gondoliers and the steam ferries' crews, following the recent elections and the killing of three men at Ancona by state troops. Socialists were said to be the instigators. A mob was breaking windows in Venice and soldiers were ordered out to preserve order. Starting out for a walk I met Mrs Fitch who was returning from down town badly frightened. Shops

in the Italian cities have iron shutters for their windows, which are closed at night and at times of disturbance

Venice is intersected by canals which take the place of streets. The only means of travel and transportation is by water. In this remarkable city there were no horses or carriages or autos or street cars. But we did see a dirigible one day flying over and around the city. There are narrow streets or ~~alleys~~^{lanes} however for foot travel, and public squares, and bridges over the canals, and ^{fine} shops, churches, and various other buildings which go to make up a city. I wandered about the city ~~a~~foot the day the strike was on, with a map for a guide, but the following day the boats were again running and we used them for an excursion with a guide in visiting objects of interest. It is an old city with a remarkable history, for a time the leading commercial city of the world, and has many monuments of its former greatness. It reached the zenith of its greatness about five hundred years ago and then had 200,000 people. It is still a large city with about 150,000 before the war. We were four days in the city

Milan. Our journey from Venice to Milan was a delightful ride by rail with fine weather characteristic of "Sunny Italy", through luxuriant fields with all kinds of crops. We passed through a number of large towns: Pavona, Verona, Brescia, and the large Lake Garda was passed on our right. Milan is a business and manufacturing city, next to Naples in size and had a population in 1911 of 599,000. It is quite modern in appearance and has fine public and business buildings. The chief ornament is the Cathedral, located in a square in the center of the city, ~~with~~ surrounded by a ~~fix~~ group of fine buildings

The Cathedral is one of the largest churches in the world, being exceeded I believe by only the St Peter's Church in Rome. It is built of white marble and is very profusely ornamented. The roof has 98 turrets and there are said to be about 2,000 statues in marble on the exterior of the building. I did not count them. I climbed to the roof

and to the highest gallery of the tower, where I could see the details of the upper portion of the building and from which I had a good view of the city and surrounding country

The cemetery, at the northwest end of the city was remarkable for the large number of artistic monuments it contained. It really forms an out-door museum of modern sculpture and is one of the most impressive places I have visited. I ~~have~~ brought with me a finely illustrated catalogue of the monuments

The second^{day} we were in the city there was a municipal election. The results pleased the Socialists and they had a large and noisy parade late in the evening. They passed our hotel about 11 30 with banners and torches, singing and cheering but were orderly. We were in Milan three days, then proceeded northward by rail to the lake region

Italian Lakes. A steamer ride on Lake Como from the city of Como to Menaggio was very enjoyable. The lake is long and narrow, lying between ~~high~~ hillsides dotted with villages making very picturesque scenery. A light narrow gauge railway took us from Menaggio to Porlezza on Lake Lugano, and then a steamer on that beautiful lake to the city of Lugano, in Switzerland. The greater part of this lake however is in Italy. It was our plan to stop in Lugano only over night, but the surroundings were so attractive that we stayed another day. We took a steamer trip to St Margherita, and a cable railway to the heights at Belvidere where we had a good view of the country. There was a charming view also from the the windows of our room at the Lloyd Hotel at Lugano

Switzerland. Going north from Lugano the railway took us amid ~~through~~ Swiss scenery through cultivated valleys rising higher and higher as we approached the St Gothard Pass and tunnel. We passed through this noted railway tunnel 9 miles long in fourteen minutes. We were eating at luncheon in the dining car at the time and the passage through the big hole was scarcely noticeable. The lights were of course turned on and it was simply like riding in the night. On the approaches to the

tunnel for some 20 or 30 miles in either direction the grade was about two per cent and two engines were used. For reaching the elevation of the main tunnel there were several spirals of about a mile in length ~~xx~~ around the complete turn and this was into the mountain at the side of the valley. The train would plunge into the mountain, make the circle and come out about 100 feet higher than where it entered. There was one spiral of two turns and we passed a certain church three times. The tunnel we passed through was one mile beneath the St Gothard Pass.

There was a great variety of scenery along the railway line; mountains tipped with snow but mostly green, or bare rocks, and there were numerous waterfalls and rapids, and many fields where farmers were making hay. The Swiss scenery is perhaps less grand and rugged and awe-inspiring along the route we took than that in the Canadian Rockies or on the Denver & Rio Grande railway, but is more picturesque and beautiful. This is in part due to the green slopes and cultivated fields and the villages in the valleys.

We left the railway at Fluelen at the east end of Lake Lucerne and took a steamer to the city of Lucerne at the western end of the same lake. This was a nice lake trip but not quite equal to that on Lake Como. Lucerne is a beautiful city and a justly popular resort. The population was stated to be 37,000, and I think it must have consisted mostly of tourists seeking pleasure and fine scenery. There are a great many hotels, in fact they form a very considerable portion of the buildings. Three of these are palatial hotels, the resort of the wealthy, but the greater number ~~fixq~~ are of a medium class and moderate price, ^{and I believe are} well kept, with comfortable rooms, good board and good service. I sometimes asked my landlord to tell me of a good hotel or pension at the next city. This he was always ready to do and it worked out very well but I came to the conclusion that the hotels were all good or nearly all of them and that if ^{select} I should ~~one~~ at random from the list in the guide books, of the class I wanted I would be well satisfied. With so much competition a poor hotel

would soon lose reputation and have to close up

There were three mountain peaks within easy reach of Lucerne provided with inclined railways or cableways for going to the summit, and with foot paths for those who preferred mountain climbing. We visited Mt Pilatus, a prominent mountain 15 miles to the south of the city. A rack railway three miles long took us to the summit. Our car was drawn by a steam locomotive with duplicate engines driving two pinions which engaged a rack on each side of the middle rail, and provided with ample safety appliances. There were frequent curves in the road and it passed through seven tunnels. The maximum grade was 43 per cent. The speed was rather slow. There were two hotels at the upper terminus, more than a mile above the base of the mountain. I walked to a lookout some higher up, easily reached by a path and stairways, where the elevation above sea level was 6,965 feet. There was a fine view of the surrounding country, or it would have been but for clouds which happened to be in the way, and I caught only a few glimpses of the landscape below. A better way is to go prepared to stay at a hotel until a clear view can be had

Among the sights in Lucerne was the ~~the~~ Glacier Garden, which was very interesting in a geological way on account of the numerous glacier mills or pot holes, some of which were very large. A working model of a glacier mill was on exhibition, showing just how these holes or basins in the solid rock were formed

Steamers. On the Swiss and Italian lakes the passenger steamers are well designed, trim looking, speedy and comfortable. These have been developed and improved through a long period of years, and are an example of the principle of the "survival of the fittest". There are many of these steamers on the beautiful lakes, mainly to accommodate the large tourist travel

We were five days in Lucerne and only about a week in Switzerland altogether, - far too short a time for seeing much of that famous

scenic country

Germany. We left Lucerne June 22 and entered Germany at Basle. Then our train took us through Freiburg and Mannheim on the east side of the Rhine but we did not see much of that river until we reached Mayence. We passed through a fine rich country on the way. The road was double track, well built, the ties were steel, and the speed probably 50 miles per hour. We stayed that night at Mayence where we had a good room in a hotel overlooking the Rhine, and where we met people from America and Australia, some of whom we had seen before.

The Rhine. Going down by steamer from Mayence to Cologne gave us a view of this river, famous for its ~~scenery~~ scenery and historic castles and monuments and bridges, its cities and large commerce. Our steamer, the Borussia was good sample of a river passenger boat, although the luncheon they served was not as good as it might have been. Its length was 240 feet, capacity 1800 passengers, horse power 1400 and speed 20 miles per hour. It was an express steamer and made but two stops, at Coblenz and Bonn. There were slower boats running on the river and I wished we had taken one of them so as to see more of the villages and get a better view of the various objects as we went along. Better still if time had permitted, to stop for a few days at each of the larger cities. The river was high at the time. Its banks were paved with small stones usually carefully laid. Ladder dredges were at work in places. I saw many islands or bars submerged with only trees visible above water. The hillsides along the river were well cultivated and a great many vineyards were in view. Cities, villages and old castles on elevated sites, all made a fine panorama ~~as~~ which unfolded as we glided rapidly down the noted stream

Freight is carried on barges about 200 feet long I estimated, in fleets of three or four towed usually by powerful sidewheel steamers. There were also some screw propeller tugs. The available depth of the river at low water I believe was 6 to 8 feet in the upper portions and

10 feet in the lower stretches. There was a railroad running along⁴⁷ on each side of the river. The state owns and control both the waterways and railroads throughout the country with certain exceptions and the policy is to secure cooperation between these two kinds of transportation by fixing rates so as to maintain a profitable traffic on the waterways. There results a more harmonious relation between these systems of transportation than is found in the United States

The Rhine being known as one of the world's greatest waterways, measured by the amount of its commerce, I looked up data for comparing it with a few of the notable inland waterways of this country. I found that the water-borne commerce on the lower Rhine was 32½ million tons of 2000 lbs in the year 1910. This is more than twice the commerce of the Ohio River and about thirteen times that of the lower Mississippi River, but it is only half that of the St Mary's River commerce for the same year, and is less than half of that of the Detroit River. I will add that it is four million tons less than the commerce of the Duluth-Superior harbor for that year, but our harbor not being a river the comparison the comparison is not really fair

Cologne. This is a large city on the Rhine with 517,000 inhabitants in 1910. There may not be as many now since the war. It is a well built city with good buildings, excellent streets, parks and various public utilities, a great cathedral, and here is one of the largest and best of the fine bridges over the Rhine. The park called Flora was a lovely place, and the Zoological Garden was good. Portions of the wide Ring boulevard, where bordered by elegant residences, were magnificent

Here I looked up an old Lake Survey associate and friend, Mr F W Lehnartz, who had retired a few years previously from government work at Grand Rapids^{Mich} and with his wife had gone to spend his last years among relatives and friends in his native city. I found them living quite comfortably in a residential suburb and they entertained us cordially. I have not been able to communicate with him or his wife during or since

the war and fear that they have not survived its hardships

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Novel Passenger Elevator. I was calling at the American Consulate in Cologne and his rooms were in an upper story of a business block. The elevator consisted of a series or chain of traveling platforms, which were spaced I should think eight feet apart and moving continuously at a moderate speed so that people could easily step on and off. These platforms went up in one shaft and down in another. How these shifted over from one shaft to the other as they must do at the top and bottom of the elevator I did not have the opportunity to learn, but I should not like to be carried past the last floor in either direction. I called to inquire whether it would be possible for me to visit the great steel and gun works at Essen. Was informed that visitors were not allowed, to my regret

Duisburg-Ruhrort. After a five-days' stay in Cologne we went to Duisburg-Ruhrort on the Rhine which I was told was the largest river harbor in the world in point of commerce transacted. It is at the confluence of the Rhine and Ruhr rivers and has a well arranged system of vessel slips excavated into the adjoining land. I saw a multitude of barges and towing steamers, waiting to be loaded. Coal from the Westphalia district was the chief commodity. The method of transferring coal from train to barges was a practical and probably economical one, but was not as rapid as the more elaborate Hulett Car Unloader of this country. I learned that 24 million short tons of freight were received and shipped from that harbor in 1910. That is a large business, but again by way of comparison the commerce of our inland harbor of Duluth-Superior (which however is not a river harbor) was $1\frac{1}{2}$ times as great.

Near the river was a finely designed and artistic monument with life size bronze statues representing Bismarck handing to the first emperor a document which I supposed was a copy of the constitution of the newly established empire following the war with France of 1870, also an inscription which signified in English:

To the Hero-Emperor William I
and his Great Chancellor

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The Grateful City of Ruhrort

It was in Duisburg that I noticed some telegraphic bulletins posted in front of a building on the main street and a group of men scanning them. Going up I saw it announced the assassination of the Archduke of Austria and his wife. This was Sunday the fateful 28th of June 1914. There was no apparent excitement among the small crowd but the men walked away in a thoughtful attitude. Little did they or I realize that the dastardly deed which was then flashed over the wires was a match which would start the conflagration of a terrible war

After two days in Duisburg we went to Berlin, passing through Essen the city of Krupp's gun works, Dortmund, Hanover etc. It was a fine farming country and crops looked good. Men and women were working in the fields

In our railroad car was a printed notice which read (translated)

For the promotion of the care
of the public health it is im-
portant to request not to spit
in the car

This was a very polite way of putting it, but most of their notices were brief, like those in our own country

Berlin. This is one of the six greatest cities of the world, with a population of 2,071,000 in 1910. It is a rival of Paris in splendor of buildings, monuments, parks, boulevards, museums and educational institutions, and in means of entertainment. We took a number of excursions and gained a superficial knowledge of the city and its suburbs, as tourists do, but the ten days of our stay did not permit us to see but little of its inner side, - the museums, schools and university, theaters and its social life. We stayed at a pension on Potsdam Street, which was rather more private and quiet than some of our previous stop-

ping places

Zeppelins. On every pleasant day a Zeppelin airship could be seen sailing over the city in the latter part of the afternoon. We saw one ~~as~~ the first thing on our arrival as we were going in a cab from the station to our room, and I stopped the driver so as to have a better look at it. This was one operated by the Hamburg-American Steamship Company. It made regular trips starting from its hangar near Potsdam about 20 miles southwest of Berlin. Its course was to Berlin and over the city, flying at a height of about 500 feet, and back to Potsdam. There were accommodations for 24 passengers besides the crew of 8 or 10. Light refreshments were cooked and served in the car. The price for the trip was 100 marks (\$23.80), with rebates to persons purchasing ~~tickets~~ transportation on their steamers. I was told that this airship had been running 2½ years and had carried more than 7,000 passengers. There were three of them operated by this company, in some of the largest cities, and the agent told me that 26,000 passengers had been carried during the past three years and without accident. I would have taken the trip myself but for the objections of my cautious wife

One evening our landlady entertained her guests by taking them up the River Spree to Treptow, one of the many popular resorts, where we had dinner in a grove with throngs of people seated at tables and bands of music. After dinner we went over to the Treptow observatory and looked through the large telescope, a 27½ inch refractor, at the moon and the wonderful star cluster in the constellation Hercules. With smaller telescopes we looked at a double star (Albireo) and the moon. This observatory is peculiar in having no dome. The telescope was not supported at its center in the usual way but extended entirely beyond the pier and was balanced by counterweights. The observer stood, or was seated, at the center of motion and no observing stand or movable floor was necessary. There were rooms stocked with photographic views and other interesting

objects, forming a kind of astronomical museum

The glorious Fourth of July was celebrated by the Berlin Americans at Gruenau, a resort about 20 miles up the Spree, in which my wife and I joined. We went by a river steamer which was crowded. We all first had luncheon, then sports and contests of the kinds peculiar to Americans, including a base ball game. Afterwards supper and addresses presided over by the American ambassador Gerard. He gave us a talk, as also did the American general consul Skinner. There was the awarding of ~~prizes~~ prizes, the calling of roll by states, also the roll by colleges which was accompanied by the college yells, and responses, and music by a band. I met many of our countrymen that day, and by a curious coincidence there were among them some of our fellow passengers of the steamer Canada whom we had not seen since we landed at Naples

We visited Potsdam by a side trip from Berlin. As a city Potsdam is not remarkable. We were shown two old palaces which were rather interesting on account of their history. One was the Town Palace, where Frederick the Great spent some of his time, and his father before him. The Sans Souci Palace is the well preserved home of Frederick the Great, the rooms and furniture remaining the same as when he lived there. His favorite greyhounds were buried in the grounds and he marked their graves with memorial tablets. The king wished to be buried near the dogs, but this was not done. Voltaire's room was shown us. That France philosopher was for a time the king's particular friend and guest. He seemed finally to bore the monarch, and to get rid of him the king decorated Voltaire's room, during the latter's absence, with pictures of parrots and monkeys and peacocks, for a hint of Voltaire's talkativeness and vanity. This naturally caused a coolness. At least so the story goes. The grounds in front of this palace, with terraces and flowers and a large fountain, were the prettiest spot we saw in Potsdam. The Kaiser's New Palace at Potsdam was not then open to visitors. We did however visit

the large Royal Palace in Berlin and were shown through many of the rooms.

Berlin has the best street pavements of any city I have visited. They are of a fine quality of asphalt. The city seemed to be well regulated and orderly. A man meeting a friend was telling him how poor Miller went boating on the river, when the boat capsized and he was drowned. "But couldn't he swim?" was asked.

"Swim! Don't you know that all persons are strictly forbidden to swim in the river?"

I went out to the aviation park at Johannesthal, where practice in flying was in progress. It is a large field and there were many machines. There were 5 or 6 planes in the air all the time. About one half of them were bi-planes and half monoplanes. The propeller always in front. The machines had a good finish.

Victory Avenue, in the Tiergarten, Berlin, has a fine lot of marble historic groups of statuary which had been contributed by Emperor William II. There was a very nice rose garden in the Tiergarten, nestled in an opening among the trees, which pleased my wife greatly.

Hamburg. This city which we next visited is the second largest in Germany, with 931,000 people in 1910. Its commerce was extensive and I saw a large number of ocean steamers and sailing vessels in the harbor. The Bismarck was there under construction which I believe was the largest passenger steamer in the world, or would have been but ~~as~~ I don't think it was completed, on account of the war. Its length was 912 feet, which is a little greater than that of the Vaterland and Imperator. At the upper end of the harbor we visited a highway bridge across the Elbe River, which with its graceful chords and fine portals was the handsomest bridge I ever saw.

There was a tunnel under the Elbe, recently built, and was used for foot travel and vehicles only. It was entered by a ~~x~~ system of elevators, six in number at each terminus at the river's edge. Two of the

elevators were for passengers and four elevators for wagons and passengers. The tunnel was double, one side for travel in one direction and the other side for travel in the opposite direction. It was well lighted and had an attractive interior finish. It was free

There is a pair of lakes in the central part of the city which make a convenient and very attractive pleasure resort. Fine residences with ornamental grounds border a considerable portion of the water. The larger lake, called Aussen-Alster, is more than a mile long, and on this lake a rowing regatta was held during two of the days we were in the city. There were crews from various cities in the country. The races were conducted in a quite similar way to those in our country. The course was $1\frac{1}{2}$ miles straight. We could see the start of the races from the room where we were staying. The regatta was well managed and went off smoothly. An elaborate program was printed. I sent a copy of it to our Duluth Boat Club for its information. We saw a Zeppelin airship over the city on several days. At Stellingen, a suburb a few miles out from Hamburg, we visited Hagenbeck's animal park which was the headquarters for the Hagenbeck shows. Adjoining this was an amusement park with all kinds of devices and stunts, many of them similar to those we have in this country. My wife and I happened to be in a playful humor and took in most everything we saw. By way of contrast with the preceding we visited the cemetery a few miles north of the city. There the grounds were large and quite thickly wooded, with natural beauty, but I did not think the monuments particularly fine. The cemetery was called Friedhof, and expressive word meaning "Peaceful place"

Kiel. This city of 122,000 is the last one we visited in Germany and we remained here only for a day. It is located on a fine harbor which is noted for being a great naval base. The city itself is attractive, as we could see from our sight-seeing tour. This tour took us also out to the Kaiser Wilhelm Canal, the eastern terminus being a mile or two north of the city. We crossed the canal on the Prince Henry

bridge about $\frac{1}{2}$ mile from the canal entrance. I would have liked to visit the entrance to see its engineering ~~maximization~~ features but had no opportunity to do so. We went aboard the German cruiser Hamburg which was lying at anchor in the harbor and were shown about the vessel. We passed through the dining room as the crew were sitting down to dinner, or luncheon. The furniture was simple and the food plain. A number of practice cartridges were lying on the deck. I did not see any large war vessels and was told they had gone away temporarily.

Afterwards I took a two-hours trip around the harbor in a steam ferry which made a nice ride, for 13 cents, with much to see; but I was not allowed to visit the government wharves and ship yards, not the aerial in that locality, bridge, which was used mainly by government employees. This bridge was a very graceful structure as seen from a distance. A small photograph of this aerial bridge which I bought showed the German cruiser Emden which happened to be passing under the bridge at the time the view was taken. This was before war was declared and the Emden had not yet achieved her fame as a destroyer of allied vessels.

We were in Germany 26 days and up to within two weeks of the declaration of war, but we saw no indications of the trouble that was brewing, no soldiers except a body of cavalry passing through the street in front of our hotel at Cologne one day. All was peaceful and normal as far as we tourists observed who were not looking for anything anything of a military character, and we enjoyed our stay in that country. It was our good fortune to complete our visit there and pass into a neutral country before the catastrophe fell upon the continent.

It was a delightful trip we had from Kiel to Korsor, Denmark, by the steamer Prince Adelbert, on a calm sea, on a fair summer day, the 18th of July 1914. Sea gulls like these we have on Lake Superior were flying around the boat. At Korsor we took a train for Copenhagen and passed through as fine a farming country as I think I ever saw. Crops

looked good and the farm buildings indicated prosperity

Copenhagen. Here we had some trouble in finding a room. The hotels were mostly filled. We took a sight-seeing trip around the city, with a guide. The city compared well with other large cities on the continent, having good buildings, streets, parks, museums etc. Our trip included a boat ride on the harbor. There was considerable commerce, judging from the vessels, which included several large transatlantic steamers. Oil is obtained from the United States by the Standard Oil Co. Coal from England. In the evening I saw an immense throng at the Tivoli, a popular amusement place in the heart of the city. The grounds were large, with a pond and other natural attractions, numerous buildings, fine illumination, a good orchestra in a music hall, bands of music here and there and a great variety of amusements, including out-door vaudeville. In one building was the most elaborate game of chance I ever saw, and it was well patronized. There were fireworks late in the evening. Two museums we visited were interesting.. We were three days in the city

Gotenburg, Sweden. This was our next stop, but only for less than one day. It is a commercial and manufacturing city of 130,000, well built and of modern appearance. We visited a large park while there.

Gota Canal. Our journey from Gotenburg to Stockholm was by a steamer through the Gota Canal. This was a delightful trip of 2½ days through an interesting country and a variety of scenery. The steamer (Pallas) was not large but was a good and comfortable boat and the table fare was excellent. There were other Americans aboard, including Mr and Mrs Colgate Hoyt of New York. This canal was built across the country connecting with the sea at each terminus, and having a summit elevation of 303 feet. Its dimensions are moderate, a depth of 10 feet and locks 110 feet long built of stone masonry of substantial character. ~~Thats~~ This was before the present age of cement. Some of the locks are excavated out of solid rock. There are 75 locks, usually with a lift of ten

feet, and there are as many as seven locks in one flight. It passes at the side of splendid water power at Trollhattan Falls on the Gota River where the falls and rapids have a descent of 108 feet. Much of the country along the canal was cultivated and farmers were harvesting grain. In some places the passengers could almost touch the branches of trees along the banks of the canal. I don't know of any journey I have taken that was more quiet, comfortable and restful. The course of the canal passed through several lakes, some of them large, Lake Venern and Lake Vettern in particular. Sweden is the native land of many of our Duluth citizens, and the more interesting to me on that account.

Stockholm. This is a picturesque city, on a harbor consisting of large natural channels which are arms of the sea, and with attractive natural surroundings. These with fine ~~muh~~ municipal improvements make it much of a show town.

President Poincare of France paid a visit to this city the day following our arrival, and was greeted with a royal welcome and popular demonstration. This was on July 25. He came on the French cruiser La-voisier and was met by King Gustaf and various officials aboard the cruiser and escorted in a royal launch to the landing near the Royal Palace, where a large body of government troops were lined up, and a salute of guns on war vessels was given. Some fine decorative columns had been erected near the landing. As we stood watching the proceedings just a little back from the front edge of the crowd, Mrs Darling who is not very tall had some difficulty in seeing past those in front. A gentleman in front of noticed this and politely invited her to take his place where she could see better. We entered into conversation with the Swedish stranger, who could speak English, and he told us that he had lived in Duluth for several years. At a moving picture show two days later we saw a reproduction of the public reception which had been given in honor of the French president.

The National Museum and the Northern Museum contain fine exhibits, and much care has been taken in preserving models of peasant dwellings and costumes, utensils, etc., also relics of the country's military history, the ancient armor and implements of war.

While down at the wharf one day I noticed a drunken sailor. This was the first time I had seen any one under the influence of liquor during our travels in Europe. My wife had seen none. Wine and beer were national beverages on the continent and were used without harm or offense to any one.

Christiania. After five days at the Swedish capital we went to the city of Norway. The trip from Stockholm was taken ~~in the~~ ^{by} night in a sleeping car, the first time we had used one in Europe. We had made it a point to travel by daylight in order to see the country. The sleeper was comfortable and satisfactory. It was divided into compartments which afforded more seclusion. My wife liked it better than she did the American Pullmans.

War was declared by Germany Aug 1, two days after our arrival at Christiania. The Kaiser was very kind in waiting until we were at a safe distance from the battle field. There was considerable excitement in the city and the American tourists made a grand rush for England and America. All boats leaving Norway were crowded. I studied the situation carefully, consulted with the American Minister A G Schmedeman and with Deputy Consul General Guttormsen, and concluded to remain in Norway for a while and watch developments. This was in accordance with the advice of these two United States officials who were well informed and were doing everything possible to aid and advise their countrymen. Mr Schmedeman is a Wisconsin man and a graduate from the University of Wisconsin. He was in Duluth once as a member of the glee club from his University, giving a concert. He was very friendly and helpful to me. For a short time there was a kind of panic in the city and no money could be obtained by tourists at the banks or agencies, but this only lasted for a day or

two

We met some Duluth people, including Mr Anton Ringesred, Victor Sonderall formerly of Duluth, Miss Hilda Larsen sister of L A Larsen, who had lived in Duluth, also Rev Mervik and family. Other Duluth people had been in the city to attend the exposition that was being held in Christiania that summer, and had returned to America.

The Exposition was a good one, quite complete, and all lines of industry and commerce were ~~xxx~~ creditably represented in the exhibits. The marine exhibit interested me in particular. Expositions seemed to be plentiful in Europe that year. There was one at Malmo, Sweden, one in Deutz in Germany, across the Rhine from Cologne, and one in Switzerland. There might have been others.

Christiania is a really attractive city with a little more than a quarter of a million people. It has a large university, though it was not in session while I was there, good museums in fine buildings, an interesting collection of old Viking ships preserved as relics, a National Theater where we heard a fine orchestral concert, another theater where we attended an opera, movies, a large public market, a large botanical garden, Parliament, and a fine natural harbor. Our 26 days' stay there was enjoyable. I attended a session of the Storting, or Parliament, which was then discussing questions arising from the war in Europe. I could not understand what was said, but the speakers were ~~xxx~~ serious and impressive in their manner.

One day we visited the Julius Larsen Taerud farm, by invitation. We went by rail 10 miles to Lillestrom, then 5 miles by horse and buggy which met us at the station, driving through a good farming country with well built houses. We were met about half a mile before reaching the place by Miss Hilda Larsen, who "feared we might not find the way". At the farm we were cordially received by Miss Hedwig Larsen, and by Mr O Jensen, an old gentleman of about 80 years, ~~xxx~~ an educator and author. Mr Larsen and wife were in the harvest field but joined us later. The

father, Julius Larsen, who died four^{years} previously, had been a school teacher as well as farmer. His wife died the previous December. Eleven children were then living of whom L. A. Larsen was the oldest. Miss Hilda was the only one of the party who could speak both Norwegian and English and so was interpreter for all.

I looked over the farm a little later. Having been a farmer myself I was interested in what I saw. The barn was large, with modern arrangements. An inclined driveway led to an upper floor where there was a small threshing machine and horse power with sweep, a feed cutter etc. Mr. Larsen was reaping oats with a combined mower and reaper. He was raking off the bundles while a young girl was driving the two-horse team. Mrs. Larsen and another woman were binding the sheaves. The machine was made in Norway. American machines for mowing and reaping are also used in Norway I was told. I saw good cows, horses and hogs. The farm had 200 acres under cultivation. The house and barn were wooden with stone foundations and tile roofs. I do not remember seeing any wooden buildings on the continent, but in Norway timber was more plentiful. There was a telephone in the house, local and long-distance. An electric lighting system was being introduced in the neighborhood. There was a good view of the surrounding country from a point a little way from the house and it appeared like highly cultivated land, interspersed with trees and farm houses, making a beautiful scene. When Mrs. Larsen came into the house from the field she was a picture of health and contentment and did not seem at all tired after her hard work.

Mr. Jensen was a fine old gentleman, educated and well informed. He derived a good income from school books he had written. I saw some of them in the house: a history of Norway, a history of the world, both well printed and illustrated, but brief and I think in simple language, also a catechism. I understood that the state supports the Lutheran Church and that religion was taught in the schools. Mr. Jensen had been superintendent of the Christiania public schools. Had been an educator for 61

years. He had lost his wife and was spending his last years with this family

These country people whom we visited evidently did not belong to the primitive peasant class which probably may still be found in portions of Norway, but are educated farmers and are to an extent refined, owing no doubt largely to their proximity to a large city and to their financial means

On our return to Lillestrom later in the same day we stopped at a state aviation field. I saw two large airplanes in a building, one of which had been flown across the North Sea from Scotland to Stavanger, Norway, by the aviator Tryggen Gran

I visited the University observatory and Professor Geelmuyden showed me the equipment. There were a variety of instruments but the refractor was a small one. He said the government did not provide enough money for the observatory. There were plans for building a new observatory on a better site near Holmenkollen which was then owned by the government. On August 21st a total eclipse of the sun passed across the country farther north, and in Christiania it was a large partial eclipse covering 91 per cent of the sun's diameter. I observed it through a dark glass which I obtained from a photographer, and quite a number of others, friends and strangers, also looked at the eclipse through my glass

Railway. Leaving Christiania we passed over the Christiania-Bergen railway which traversed some elevated country and the summit^{at Finse} was a region of snow. This was in August. There was said to be good skiing the year around in that locality. Yet the elevation was not so great - 4270 feet above sea level. Of course the snow line is lower in those northern latitudes. This road is 308 miles long. It passes through 184 tunnels one of which is more than three miles long. The road is modern and accommodations good

I noticed that the rock surfaces along the line of the road had been smoothed off by ancient glaciers, from base to summit of the hills.

so that the peaks were rounded off and were nothing like as rugged and broken as in our Rocky Mountains where glacial action did not occur. This road is not equal to the Denver & Rio Grande or the Canadian Pacific for grand mountain scenery, yet is a picturesque line

Before reaching Bergen we stopped off at Voss and took a side trip by auto to Stalheim, a ride of ²²~~222~~ miles over a good road and among fine scenery. At Stalheim was a large hotel and a commanding view of mountains and valley. Then by a one-horse cart called a stolkjeerre we ~~went~~ down by a steep, zigzag road, into the valley of the great Sogne Fjord which extends a hundred miles inland from the ocean. It was in this fjord I believe that Kaiser William was cruising with his yacht just before war was declared. On either side of our road were high mountains and numerous waterfalls. It was certainly grand scenery. We drove as far as the harbor of Gudvangen at the ^{head}~~head~~ of the fjord. It was here ^{on the 6th of August} that we were to meet the steamer Thalia, and go aboard for a polar cruise. The cruise was cancelled, on account of the war, while we were at Christiania

I saw a small monument near the hotel at Stalheim commemorating a visit which the German Kaiser made to that resort. I think there had been a very friendly feeling towards Germany. Just what the attitude of the Norwegians towards Germany ^{was} after the declaration of war I could not tell, except there were expressions of fear that Germany would occupy Bergen for a naval base. ~~xxxxxx Norway for 35 days~~ They seemed to be very reserved about expressing sympathy for either one of the belligerents

We returned to Voss, then by auto 20 miles over another fine scenic road to Eide at the head of the Hardanger Fjord, then by steamers through this great arm of the sea to the North Sea and to the city of Bergen

Bergen. This is an important commercial city with a good harbor. We were there five days. It is an interesting place, both on ac-

count of its location and the surrounding natural scenery and because it is a well built and modern business city. Its population is stated to be 72,000. Although smaller than Duluth it has a fine large museum, of which Duluth cannot yet boast. Ship building, and the fishing industry are quite prominent. Their fish market, which is mostly in the open air on the harbor front and held on one day in the week was patronized by large numbers. There is a large public park which we looked through. The National Theater is a first class building. We attended a play there, a comedy called Alexander the Great which seemed to be well acted, although we could not understand a word of the dialogue. There was a club, the name signifying Good Purpose Club, to which I was given a note of introduction by the American Consul, and where I spent an hour enjoyably.

Telegraphic war news were thrown on a screen evenings in front of the office of one of the daily papers (as was also done in Christiania), and much prominence was given to war news in the papers. I used to get some one to translate the headlines for me. There was a party of Russians stopping at the hotel where we were, on their way from France and England to Russia. One morning as I was trying to have the clerk read the news to me, one of the Russians, a plump-cheerful looking fellow seeing me came up and we had a little talk about the war. Neither of us could speak the language of the other, nor Norwegian, but he could speak German and I had a slight acquaintance with ~~that~~ it. He promised to speak very distinctly and we compromised on that language. He was very ~~enthusiastic~~ optimistic and told how the Russian forces were going to march in a solid column on to Berlin. I reminded him of recent news of the capture of 60,000 ^{Russian} prisoners by the Germans. He claimed there were only 30,000 captured, but said that was only a drop in the bucket, and that his country could put eight million men in the field at once. I couldn't help but smile as I listened to him.

The American Consul told me that the ~~the~~ ~~German~~ ~~government~~ officials

from the U S cruiser Tennessee had been in Bergen for a week, with relief money to aid stranded Americans, but had found only 2 or 3 persons requiring pecuniary assistance

We wanted to get to Scotland but the reports of mines in the North Sea caused me some uneasiness. I consulted Mr Rasmussen, the American Consul about it and he said he had had many inquiries of the same kind. He had just looked up all the reports in Bergen and English papers of vessels sunk by mines and could not find that any of them were off the English coast but seemed to have been mostly near Denmark. He considered the danger from mines very ^{off the}. The Thomas Cook agency with whom I was doing business also thought there was not much danger from mines. Steamers were running regularly from Bergen to Leith and ~~Kawassika~~ Newcastle, without mishap. I engaged passage on the Sirius to sail Sept 2 for Leith, Scotland, but when we went down to go aboard the vessel was not there. I was informed that it would not sail on account of trouble with the crew. They wanted more pay and some provision for their families in case of accident. We went back to our hotel and next day engaged passage on the Neptune of the same line to sail that day for Newcastle. The name of the steamship line was the Bergenske Dampskibsselskab, a name which the Germans would find hard to beat, meaning The Bergen Steamship Company. However the astronomical names Sirius and Neptune gave me a friendly feeling for the steamers

We went aboard the Neptune which was to sail at 1 o'clock P M but it did not leave the wharf until 40 minutes later and then only went to another part of the harbor and dropped anchor. I then learned that there was a strike of the crew for double pay and insurance for their families. There were twelve men short and officers of the boat were ashore trying to fill their places. We made a start at 11 20 that evening, Sept 3, and the steamer ran along the coast southward in water sheltered by islands but stopped again early in the morning at Hugesund, to get more men to fill out the crew as I was told. After an hour and a half we made another

start and headed across the North Sea. My recollection is that even then our steamer did not have a full complement of men. The course was laid for Scotland as I afterwards learned, keeping well north to avoid mines

There was quite a large passenger list and I think the rooms were all taken. Our room had been assigned to another by mistake and we found it occupied by some baggage, but the gentleman who was the Russian Vice Consul to London kindly went into another room with a friend. There were several Russians aboard. They talked with each other in their own language but could speak English quite well. They seemed to be a pretty good class of people. One of the party was going into England to purchase war material for the Russian government, to the extent of some millions of dollars as he told me, including a large quantity of barbed wire. He was afraid he could not get as much as he wanted in England and asked me what the chances would be in the United States. I gave him what information I could but that was mighty small

When off the coast of Scotland, near Peterhead and Aberdeen, I saw a number of vessels, five at one time, some of which might have been steam trawlers. The presence of these vessels was reassuring to me as it indicated no great fear of mines, and besides that, in case of anything happening to our vessel assistance would be near. From off Peterhead our steamer ran southward for Newcastle. As it grew dark and we neared the mouth of the River Tyne we watched the lighthouses and the lights of the towns, and the piercing rays of powerful search lights which scanned our vessel to see whether we were friend or foe

We entered the Tyne about 9 P.M. after taking on a pilot. The trip of nine miles up the river was in full moonlight and a clear sky, and was very impressive on account of the large number of vessels, docks, shipyards etc on both sides of the river all the way up. It kept me running from one side of the vessel to the other. Could not see objects as plainly as I would like. I also took time to cast my eye towards the northern sky and look at Delevan's comet which was dimly visible

in the moonlight. I had been watching this comet while in Norway since the 13th of August when I first saw it. We arrived at Newcastle 10 20 P M Sept 5. Passports were examined and questions asked by an official who came aboard. Many went ashore to take the midnight train for London. One American was going to Paris to look up some baggage. My wife and I remained aboard the steamer that night, our minds greatly relieved and our sleep peaceful from having escaped the deadly mines of the North Sea

ENGLAND AND SCOTLAND

Newcastle This city is a large industrial center of something more than 200,000 located on the Tyne River nine miles from its mouth. It owes its importance to its being very near very extensive coal fields. The entire river for a distance of ten miles from its mouth up to and beyond New Castle is lined on both sides with shipyards, dry docks, floating docks, tidal docks, coal docks or staiths for shipping coal, floating derrieks, gun works, and I dont know what else. These establishments were immediately adjoining the river Tyne, while just back of them were a series of workmen's villages well built up with brick tenements, clean and comfortable looking. There were also several towns of considerable size, some of which might rank as cities, included in this stretch of river, as Gateshead, South Shields, North Shields and Tynemouth.

If Newcastle should follow the example of some of our ambitious American cities and extend its corporate boundaries so as to include all these towns and industries along the river for a distance of about ten miles its population would perhaps be double or treble what it now is and yet be less than half as long as Duluth and not much wider

The great Armstrong shipyard and gun works are located on the river just above the city, where war vessels are built for Britain and for other governments. At other shipyards large Atlantic liners have been built, including the Mauretania and Lusitania

As I looked over this busy English river my thoughts turned to our own St Louis River at Duluth, and wondered whether it too might in coming years develop into a similar scene of intense industrial activity. Duluth and Superior in the last half century have made quite a start in this direction, and when this locality has enjoyed as long a period of development as Newcastle has passed through several hundred years, who can say what the enterprise of our

Minnesota and Wisconsin people and the necessities of the great tributary northwest territory may bring about?

A Tidal Dock On account of war conditions visitors were not allowed to visit and inspect public works, but with the aid of my passport and a little diplomacy I gained access to one of ~~these~~ the tidal docks, the first example of such a dock that I had seen. It was the Tyne Dock, located a little above the mouth of the river and near the city of South Shields. The purpose of the dock is to permit of loading and unloading vessels in quiet water free from the tidal movements. The range of water level in that locality was said to be 15 feet. As is well known to many, gates are provided, similar to the two leaves of lock gates for lift locks and opening inwards to hold the water in the basin constantly at the level of high tide. This basin inclosed 37 acres and has accommodated 60 or 70 vessels at a time. On the margin of the basin were grain elevators, coal docks which are called staiths, for loading vessels with coal and which have a slight resemblance to our ore docks, and other industries where vessels were taking on cargoes.

Vessels usually enter the basin, or leave it, at high tide, as it is only then that the above mentioned gates can be swung; but in addition to these gates there was a lift-lock, similar to the locks used in canals, by means of which a vessel could pass in or out at any time if desired. I believe however it is only used in an emergency as lockages through it draw water from the basin. All the gates were operated hydraulically. An official accompanied me and very courteously explained various objects and methods

I noticed a torpedo net in front of the lock, which was a reminder of the war then in progress. Other reminders of the war which I saw were some newly made defenses along the ocean shore at Tynemouth consisting of rifle pits and sand bag parapets, and barbed

wire entanglements, to provide against land attacks by the enemy. When at Tynemouth I had a desire to walk down to the mouth of the Tyne River and look at the breakwaters but the public was not allowed to do so. In fact the road leading to the river was closed by a fence

There was a military camp for recruits at Gosforth Park a few miles north of ~~the~~ Newcastle, which I visited one day, and two smaller camps nearer the city. Several times I saw companies of soldiers marching through the street past our hotel. The men appeared to me rather inferior in size and weight

The city parks seemed few in number. ~~Jesmond Park~~ Jesmond Dene Park, which we visited had a long walk along a small stream through dense luxurious shrubbery of great variety, and which lead us to the ruins of an old mill and waterwheel and where there was a pretty waterfall and a stone bridge. Tynemouth, a popular resort at the seashore near the mouth of the river was an attractive place, something like a great park, and helped to make up for any deficiency in the park system of the city. There were several bridges across the Tyne. These seemed to me lacking in originality and beauty

Edinburgh. Our train brought us here from Newcastle, 124 miles, with a speed of 54 miles an hour and without a stop. This fine city is always attractive to tourists and proved so in our case. We remained there very pleasantly from Sept 14 to Oct 5. There is much to be seen of interest both in the city and suburbs and at surrounding points within easy reach by rail or sight-seeing cars. These cars or auto buses are large and comfortable, comparing favorably with those we used in Berlin and Cologne, and the country roads were in good condition. The city seemed more cultural than commercial, and its museums and university and other institutions were of a high order. We stayed at the Darling's Regent hotel, owned and conducted by Miss Jane Darling, a fine looking and estimable woman, who inherited the property from her father, James Darling. We naturally felt

quite at home at this place bearing our own name, although we found no evidence of relationship. The name was quite common in Edinburgh, as I found eighteen Darlings in the city directory. I noticed the name of a firm on Princes Street reading Henry, Darling & Co, which reminded me of my father's name, Henry Darling. We were entertained by Professor A J Pressland of the Edinburgh Academy whom we had met in Norway. He also kindly assisted us in seeing portions of the city and was a good guide. He was a bachelor, and had rooms in a house which had been occupied by Thomas Carlyle and wife in the years 1826 to 1828. Among the former students at the Edinburgh Academy were the names of J C Maxwell, P G Tait and Robert Louis Stevenson, the first two distinguished in science and the last one in literature

At the City Observatory I was shown the instruments by Mr Pearson the assistant astronomer and looked through a six-inch telescope at a number of objects, one of which was Delevan's comet. There was a larger refracting telescope with a 22-inch lens, 30 years old, in another building, which did not seem to be in use. I was told that the first observation of Jupiter's fifth satellite, after its discovery by Barnard at the Lick Observatory in California in 1892 was made with this 22-inch refractor. The City Astronomer, Professor William Peck, was then absent on a vacation. No systematic work was conducted. The present purpose of the observatory was stated to be the popular instruction of the citizens of Edinburgh in astronomy. There was another observatory, the Royal Observatory of Scotland, on Blackford Hill, south of the city, but to this I failed to obtain admission

At the Scottish Museum I saw a fine working model of the solar system, inclosed within a large spherical glass. It showed the relative sizes, relative logarithmic distances and relative motions of the planets and satellites, and was run by an electric motor.

Something was out of order and I did not see it work. The glass sphere showed the principal constellations, like a celestial globe. It was of German manufacture and possibly for this reason the Scotch officials did not care to operate the apparatus

One of our excursions was through the Trossachs and lake country, with a Thomas Cook party of 19 persons and a conductor. We went first by rail to Aberfoyle, passing over the great Forth bridge and through Stirling, a good farming country. The land was mostly owned by the Duke of Montrose and a 99-year feu was given the tenants. Stirling Castle was then occupied for military purposes and so was not visited. The Wallace monument was a prominent object as we saw it from the train. From Aberfoyle went by coach to Lake Katrine, passing through a hilly country where the purple heather was abundant. The last few miles of this stretch was through the Trossachs with beautiful forests of oak, silver birch, mountain ash etc on the hillsides at the sides of the road. The Trossachs however were hardly up to my expectations

We had a well informed and courteous guide or conductor who made frequent allusions to the scenes of Scott's novels and to historical events as we passed along. Once we stopped our coach and gathered heather and picked berries. A steamer took us through Katrine, a pretty lake with islands and more history. This lake now supplies the city of Glasgow with good water

Between lakes Katrine and Lomond we rode in a very disagreeable rain with a hard wind in an open coach with only umbrellas and lap blankets. It was the opinion of the passengers that the company should have given us better protection. Another steamer took us through Lake Lomond. Here a hard rain marred the view. It is pretty, with islands and surrounded with green hills, "the queen of Scottish lakes"; but compared with the Italian and Swiss lakes Como, Lugano and Lucerne it is less grand and imposing, the hills not as

high and fewer villages and dwellings along the shores. Our steamer was a good and fast one. On the shore of the lake I saw a fine example of glacial furrowing on the rock surfaces, the marks running in a southerly direction. From this lake we went by rail to Glasgow and returned by rail to Edinburgh. The entire trip took 12½ hours.

Another excursion from Edinburgh was by auto-bus to Melrose with its "far-famed glorious ruin" Melrose Abbey, and to ~~Abbotsford~~ Abbotsford the fine home of Sir Walter Scott which has been carefully preserved just as he left it. We also went to Dryburgh with its Abbey in ruins, where Scott was buried. We passed through Galashiels on the River Tweed with its woollen mills. These mills were then working on a large government war contract. This was a delightful ride, over good roads, through a fine picturesque country, and it took us through some coal mining towns.

On one of our trips by auto-bus we went to the Forth bridge, an immense steel structure of the cantilever type. This is familiar to many through published descriptions and illustrations. We were not permitted to go close to the bridge on account of war regulations, and had to be content with viewing it from a distance of half a mile up-stream. It was an impressive sight.

Another trip was to the Roslyn Chapel ruins, Penicuik, Carlisle and Pentland. We also went on another day to the beach resorts of Portobello, Joppa, Musselburgh and some other points. I went alone to Leith one day, the harbor of Edinburgh, but was not allowed to visit the water front on account of war restrictions.

At the Scottish Museum I met the venerable geologist B M Peach LL.D F.R.S., then retired on a pension. He was for forty years on the geological survey of Scotland. He was past seventy but strong and vigorous, and was conducting examinations in geology in various parts of Britain. He kindly took me one day in a carriage on a visit

of inspection to the rocks and lavas of Arthur's Seat, an ancient volcano in the eastern portion of the city of Edinburgh. He drove around the mountain on the Queen's Drive, and made frequent stops and excursions with me on foot up the sides. He pointed out the sedimentary rocks and the various flows and intrusions of lava, the faults, slips, effects of cooling, horizontal slips with grinding and smoothing of the rubbing surfaces, the solid lava at the bottom of a flow and the porous lava with air bubbles at the surface, the denudation by long exposure to weather and later scouring by glacier movements. The downthrow at one fault was ^{as} much as 2,000 feet

We spent two hours in the examination. This visit with my distinguished guide was a great revelation to me of the wonderful things which have happened during the geological history of that small portion of the earth's crust. The locality is a national park. Many soldiers were there engaged in drilling, signalling and target practice

An evidence of ^{war} preparations was the recruiting for enlistments. A recruiting car on the street railway, finely decorated with colors and transparencies drew a crowd near our hotel on several evenings. It displayed fine pictures of the king and queen, and prominent notices like the following: EDINBURGH RECRUITING CAR. SCOTSMEN STEP IN AND JOIN THE ARMY, NO WAITING. TAKE SEATS FOR BERLIN. The car was well illuminated. A piper was playing on the top. Inside were chairs, a table and officers

There did not seem to be much excitement over the war. As far as I could tell business was as usual and amusements were in full blast. There seemed to be a feeling of confidence that the allies would speedily win. Prime minister Asquith made an address one evening at Usher Hall. I went to hear him but could not get into the building although it was three-fourths of an hour before the time for him to speak. I estimated that as many as 2 or 3 thousand were

standing outside, with the doors closed and about fifty policemen guarding them

While in the city I was reading a copy of Engineering, or The Engineer, I have forgotten which, one installment of a series of papers on the trade situation in Britain regarding the manufacture of machinery as it might be affected by the war, and the opportunities the war might bring for improving present conditions. It referred to German competition which had greatly injured the British industries by "dumping" the German products on the British markets at lower prices than could be met by local firms. Among several propositions this was suggested by the writer: When the British forced invade Germany to then raze the iron works, mills and shops, destroy them, and thus make impossible future German competition. The writer added a possible objection that might be raised to this plan, namely, that if this were done and Germany's industries crippled how could the defeated country raise the money to pay the war indemnity that would be levied? This illustrates the spirit of confidence in a speedy victory. We left Edinburgh Oct 5 and went to Glasgow

Glasgow. This is the second city of Great Britain in size, with 784,000 inhabitants in 1911. It is on the Clyde River, and the city and river bear some resemblance to Newcastle and the Tyne, in being the scene of a great shipbuilding industry, and situated near extensive coal fields. A steamer trip down the river one day gave us a view of the ship yards and other industries located on the river

On this trip we came to a large ^{new} battleship, the Benbow, which was pulling out into the channel with the aid of tugs. Our river steamer had to stop and wait for it to straighten up before we could pass. The battleship was going to sea, but its destination we did not learn. A large number of the crew was on deck and crowds of people ashore were cheering as their sailor friends departed probably

for some scene of action or service in the great war

I noticed a large establishment on the right bank of the river with the sign Singer Manufacturing Company, which I supposed was a branch of the American company of that name for the manufacture of sewing machines. As we proceeded down the river we passed flocks of sea gulls which looked the same as the gulls on Lake Superior and in other parts of the United States; but they alighted in pasture fields near by, while I believe the American gulls do not alight so far from the water

We did not and could not stop to visit ship yards and other factories, and ^{I was} ~~am~~ sure no visitors were allowed to do so, under the war restrictions. Many vessels were under construction. Soon after we arrived at Greenock, a large port ^{near} ~~at~~ the mouth of the Clyde the battleship Benbow passed us, headed for sea. The large passenger steamship Olympia lay at anchor, a sister ship to the ill-fated Titanic. The Olympic was running to Greenock (for Glasgow) instead of to English ports, on account of the war. There was not enough depth of water in the Clyde channel for it to proceed up to Glasgow

The Clyde river used to be so shallow before improvement that one could wade across it in a certain place. Over \$40,000,000 has been expended in widening and deepening the river from its mouth up to Glasgow, a distance of about twenty miles, and it is now navigable by vessels drawing 26 feet. This important work was done by the municipality of Glasgow, and it has added so greatly to the city's commerce and wealth that the investment was a very profitable one

Glasgow has the finest park system that I have yet seen in any city. There are many parks and they are generally of large size, and are well kept up. We visited a number of them. One of them is Kelvingrove Park, a lovely place, and which is enriched architecturally by the fine buildings of the Glasgow University and the Art Gallery. Another called Glasgow Green, near the river, has

a branch Corporation Museum on its grounds. There were also Queen's Park and Rouken Glen. The latter was 8 or 9 miles out, to the southwest, reached by an electric line, and has interesting natural scenery. There were a lot of Belgian refugees at Rouken Glen at that time which were being cared for by the citizens and housed in one of the park buildings. There were still other parks which we visited but their names I do not now recollect

The University interested me and I visited it several times. It was here that Sir Wm Thompson taught (afterwards Lord Kelvin), and Professor W J M Rankine the noted engineering authority and scientific writer. His treatise on civil engineering was one of my text books at the University of Michigan. The Hunterian Museum is a part of the university. I called at the University Observatory and was shown through it by the astronomer Professor L Becker. It was fairly well equipped with instruments. He showed me some of his own inventions, of considerable ingenuity, relating to astronomical photography and a method of illuminating the divisions on a circle by carrying light lengthwise through a ~~glass~~ solid glass rod. Some time after my return to America I saw reports of Prof Becker's removal from the university on account of his German birth

A series of concerts had that year been planned by some city organization for the following winter on quite an elaborate scale and with finely printed programs, prepared before the war started. A number of distinguished German musical artists were on the program. Later in the season after the beginning of the war the popular feeling was such that it led to a revision of the program and the elimination of all Germans and the substitution of British, French and American artists

I noticed little or no popular exhibition of enthusiasm or excitement in Glasgow regarding the war. Business and pleasure were rife and the main streets were at times crowded with people. As

I looked on the multitudes, including the usual proportion of young men, it seemed as if it should be no trouble for Britain to obtain another million of recruits for the war at once. The recruited troops I saw in Glasgow, which were sometimes marching through the streets, were larger in stature and sturdier looking than those I saw in Newcastle

A large old cemetery, called The Necropolis, on a commanding hill in the eastern part of the city, was crowded with gravestones of all kinds and sizes. These markers were mostly plain and unartistic, and undeserving the name of monument. Compared with the monuments in the Milan cemetery the contrast was striking. Some were of historic interest, like that of John Knox. George Square, in the center of the city, was enriched by a large monument to Sir Walter Scott, and with a number of other fine statues of other national ~~celebrities~~ celebrities

Glasgow gives us an example of successful municipal ownership of certain public utilities. Their officials and business men seem to have had the right qualities ^{of} civic spirit and enterprise combined with wise and honest management which are too rare in our large American cities. It has led in the work of municipal reform in Great Britain. I will mention one or two items out of many. It took over the street car system from a company, in 1894, and leased it to the company under regulations and supervision which have worked out well. Extensions were made, the horse-car service was replaced by electric traction, all completed in seven years. After carrying out the improvements and charging the low rate of one cent for short rides and two cents for longer ones, reducing the hours of its employees from 14 to 10 and advancing their wages, the city has managed to pay expenses, interest on capital, and depreciation, and lay aside annually a clear profit of \$300,000. There are municipal lodging

houses where the charges were 7 to 9 cents per night which yielded a revenue above all expenses including interest. A municipal family home accommodated the families of widows or widowers who had to be away from their children during the day. This had a nursery, play rooms, play grounds, and nurses to care for the children. The charges were low: 76 cents per week for mother with one child, 92 cents in case of two children. Board: breakfast five cents, dinner 8 cents, tea 6 cents. I don't know what the ledger balance was on this. The above are pre-war data which I obtained from the New International Encyclopedia

After leaving Glasgow Oct 26 1914 we spent three days in Ayr, a city closely associated with the poet Burns, then a day in Penrith, another day in York, and five days in London. The recent discovery of mines north of the ~~Irish~~ Irish coast, endangering navigation by the North Channel, and the anxiety of our American friends for our safety, led us to hasten our departure for America, and we at once engaged passage to sail from Liverpool on Nov 6 for Montreal by the steamship Missanabie of the Canadian Pacific Railway line

The few days we spent in London were industriously occupied in seeing some of the noted objects of that great city, all of which were new to my wife. At night the city was darkened by the extinguishment of street lights, for protection against air raids.

Amusements and entertainments however seemed to be in full swing

On our way from London to Liverpool I saw the Runcorn Transporter Bridge, what we Duluthians call an aerial bridge, which spanned the river Mersey near Liverpool. The structure was of the suspension type. There is at least one more of these peculiar bridges in England, and several in France. I saw one at Kiel, Germany

After the outbreak of war I kept in touch with the U S Consuls in the large cities, and found their information and advice of great value to me in regard to the danger or safety of remaining

and visiting in Norway, Scotland and England. It was not until in October that danger in crossing the Atlantic became apparent. I always found these officials very courteous and ready to assist me in ~~any way~~ every way. They always received a number of the leading American newspapers and gave me opportunity to read them. I shall always remember with pleasure the following gentlemen: The U S Minister to Norway, Schmedemans, at the legation in Christiania; B M Rasmussen, U S Consul at Bergen; Mr Fleming, U S Consul at Edinburgh; J H McCunn, U S Consul at Glasgow; the U S Consul at Newcastle whose name I have forgotten, and U S Consul General Skinner at London

Our ocean voyage from Liverpool to Montreal was without event. The route was to the south of Ireland which so far was open and entirely safe. The cabin windows however were darkened with blankets for fear of raiders. We met some rough weather and Mrs Darling and I were seasick for a time. Our steamer was nearly new and was nice and comfortable. It was a one-class steamer, not as elegantly furnished as the first class of the great liners, but I think was superior in its accommodations to the ordinary second class. There was a large passenger list. There was plenty of sociability and entertainment, games on deck, music by orchestra every day at dinner, and in the drawing room each forenoon and afternoon. A steinway grand was in the ~~dining room~~ drawing room and an upright in the dining room. There was considerable solo playing, and some singing. One evening a Whist Drive was held in the dining room, what we would call progressive whist. There were 14 tables. Each table played one hand and each player's score was marked by opponent. When all tables had finished one hand a bell was rung and the winners moved up and ladies changed seats. Ladies' prizes were given to the highest, second and lowest; also gentlemen's prizes. A concert was given one evening by artists and musicians among the passengers, assisted

by the orchestra and by some of the crew who had talent in a musical way. The concert was arranged by a committee, and was held in the drawing room. A nicely printed program was gotten up in the ship's printing office. Humorous recitations and comic songs were included

The latter part of our trip was up the St Lawrence River. This was in smooth water and very enjoyable after the rolling we experienced on the ocean and in the gulf. It was a long course up the river, taking nearly two days, but fine appetites, good food, genial company and rather interesting scenery, all added to our pleasure. I almost regretted to leave the steamer

We had made a brief stop not long after entering the river, at Rimouski, where letters were mailed and telegrams sent. Another brief stop was made at the historic city of Quebec. We arrived at Montreal, the end of our journey, at six in the evening of November 16, 1914. Friends were at the wharf to meet us and take us to their home, and we remained in the city a few days. We then visited in Ottawa with my sister and other relatives and friends. Then a brief visit in New York City, and a longer stay in Washington and Philadelphia. We returned to our home in Duluth January 13 1915 after an absence of nine months, of which seven months were abroad and two in the eastern part of this country

It may be of interest and use to some reader for me to state here that the total expenses of my wife and me during the 9.2 months away were \$2917. This is at the average rate of 317 per month or \$74 per week. I had previously noted that on our trips in this country of several weeks duration, to Florida or the Pacific Coast, etc, the cost for us two averaged about \$100 per week. Trips by me alone cost about 56 to 61 per week. The foregoing includes transportation and all other expenditures. The method of estimating the cost was simply to note the amount of money we started with and deduct the amount on hand when we returned

ASTRONOMICAL OBSERVATORY

After returning from our trip to Europe and the eastern states the idea of building a private observatory was seriously considered. Already I was the possessor of a small telescope, with a $2\frac{1}{4}$ -inch objective, which I had bought in 1902, and this with the backyard of my home for an observatory, a wooden tripod for a pier, and the celestial vault for a dome had afforded considerable pleasure to me and also to my neighbors who were occasionally invited to take a look at the planets, comets and the like. Of course I tried to tell my guests some of the most interesting facts about the objects viewed, and I was pleased to see that my visitors were generally interested in what they saw and heard. During those years I also gave occasional public addresses on astronomical subjects, usually illustrated with lantern slide views. However, my rather exacting and onerous professional work of engineering made it impossible for me to give much attention to this side issue of astronomy.

Then my retirement from engineering work, already noted in these pages, materially altered the situation. With more leisure and means I planned to get a larger telescope. During the year 1915 I looked over the city for a suitable site for an observatory, and visited some instrument makers, at Cleveland and Chicago, and obtained prices. A written permission from the city of Duluth was obtained to occupy a site on an unimproved park on West Third St between 9th and 10th avenues, now known as Observation Park. This permission was given on condition that the observatory should be open to the public at such times and under such conditions as the owner might deem practicable and advisable.

This condition was entirely agreeable to me, as it was already my intention to share with others the pleasures and benefits which the larger telescope might afford, as I had been doing in a modest way for years at my home as I already mentioned.

Of course there were adjustments remaining to be made. It was cloudy that day, but the following day, April 15 1917, was fair and then for the first time the telescope was pointed towards the stars. By a curious coincidence this was the date of ~~xxx~~ my seventieth anniversary. The first object which I ~~xxx~~ viewed that night was the planet Saturn with its remarkable ring. It showed well and was a fine sight which gave me great satisfaction. One of the tests of the lens which I made at another time by daylight was to read the fine print of a newspaper at the distance of about 700 feet from the observatory

The purpose of the observatory is briefly expressed by an inscription on a bronze tablet placed on one side of the entrance, which reads:

ASTRONOMICAL OBSERVATORY
BUILT IN 1916
BY
JOHN E. DARLING
FOR HIS PRIVATE USE AND FOR THE
PROMOTION AMONG DULUTH
CITIZENS OF A POPULAR KNOWLEDGE
OF THE NOBLE SCIENCE OF
ASTRONOMY

Six evenings each month are given to the public, except when cloudy weather prevents. The days selected for these evenings are when the moon is at its best for telescopic observation. This our nearest celestial neighbor, with its rugged surface, its mountains, plains, and its numerous and remarkable circular pits or ringed plains called craters, seems to be the most attractive object for the average visitor. Planets, double stars, multiple stars, star clusters, and other objects are also viewed through the telescope. An illustrated talk, given in the waiting room with the aid of lantern slides, usually precedes the use of the telescope and helps to a better understanding of what is observed. The interest of the visitors is shown by



questions asked and by various expressions of surprise and delight. About $2\frac{1}{2}$ hours are thus given to the visitors in an evening. No charges are made. Previous reservations are made by phone so as not to exceed a convenient number which is about fifteen, although I have often admitted a larger number. Many apply who cannot be accommodated. There have been more than three thousand visitors, counting the reappearance of those who come more than once, during the three years and four months since the observatory was first opened to the public in May 1917. Evidently my observatory has proved useful and fills a want in the community

I have not considered it wise for me to undertake serious research work under present circumstances, but am hoping that my successors will do so when the observatory finally passes to the city of Duluth, for which I have made provision

Some years ago, at various times and places, I gave quite a number of public lectures or addresses on astronomy. These I discontinued and am now giving only the talks to visitors at the observatory. Astronomical articles are contributed by me, monthly or oftener, to one or the other of the Duluth daily papers. Some of these articles are illustrated by original drawings

Solar Eclipse In June 1918 it was my good fortune to join an astronomical party which observed ~~which observed~~ the total solar eclipse which occurred on the 8th of that month. In this party were Professors F F Leavenworth and W O Rea of the University of Minnesota, Professor H C Wilson of Carlton College Minn, Mrs Leavenworth, and myself. ~~XXXXXXXXXX~~ A site was selected at Fraser Colorado near the central line of the path of totality, about 85 miles by rail northwesterly from Denver, among fine mountain scenery. We were fortunate in being able to see the sun through a break in the clouds, at the critical moments

of totality. I used this for noting the second and third contacts and calling off the times for the other observers. Between these contacts, that is during the total phase, I had a fine opportunity for observing the sun's surroundings, in particular the wonderful chromosphere and prominences. Here I will quote from my communication to Popular Astronomy printed in the number for August-September 1918 pp 153,454:

Immediately after the second contact the dark glass screen was laid aside and there burst upon my view the orange-colored chromosphere, and rose-pink prominences of various sizes and forms and of curious detail, surrounding the black round disk of the moon. These as viewed through the telescope, and with the bright white coronal light for a setting, formed a picture of indescribable beauty. Several large prominences like mountains of flame extended outward into the corona to a distance of perhaps one-tenth of the moon's diameter or from 75 to 100 thousand miles above the sun's surface. One or more of these prominences were plainly visible to the naked eye. One tree-like prominence on the westerly edge of the sun, with horizontally spreading branches, delicately and distinctly outlined, impressed me with its beauty.

The forms of the prominences were generally of types which have heretofore been observed and described, as far as my brief view enabled me to judge, but no description I have read conveyed to my mind an adequate conception of the richness of coloring shown by actual vision. The Elysian fields of classical mythology might find a fitting representation in the entrancing picture presented within the telescopic field. Gladly would I have watched and studied the details of the prominences during the entire brief minute and a half of totality, but this could not be as other things were on hand.

The corona was best seen with the naked eye. It was much brighter than I expected to see, * * * * *. Its brilliancy was indeed a surprise. I noticed three prominent coronal extensions, but time was too brief for sketching; besides I did not think it worth while to try to compete with the more truthful photographs which I believed would be obtained.

Vainly I watched the western mountains and valleys, before totality to see indications of the approaching lunar shadow, and of the receding shadow after totality. The curtain of clouds which covered probably 95 per cent of the entire sky was what deprived us of that anticipated spectacle.

During totality the darkness was pronounced and gloomy. It undoubtedly was intensified by the cloudiness which shut off from the surrounding country much of the coronal light. Off in the southwest was some clear sky, and there I saw what appeared like a twilight, strong near the horizon and diminishing in brightness with altitude. This light I suppose was the illuminated atmosphere beyond the lunar shadow which was at least a distance of about thirty miles from us. After the eclipse was over a maid told us that the chickens at the hotel went to roost as the darkness came on, or rather that all but one of the seven chickens did so. I believe the girl reported truthfully. It did not appear whether that one chick-

(a) I am a member of the Old Settlers Association of the Head of Lake Superior, and it was in response to the request of this association that this story of my life has been written. Its officers urgently solicit all the older members to write their experiences, with special reference to this part of the country, and to place the papers on file with the Secretary for purpose of reference and to provide material for future historians

en had obtained inside information about the eclipse or was simply not in the habit of retiring early

From this experience I would say that a total eclipse is worth going a long way to simply look at; provided of course a person has the means and is willing to take a chance on the weather, and further that he provides himself with a moderate sized telescope. The remembrance of the view will be an abiding pleasure

Since my retirement from active engineering work I have occasionally given my support to what appeared to be worthy projects for the improvement of national waterways. I am a member of the American Society of Civil Engineers. Recently I represented the Seventh District of that society on the Nominating Committee. For some years I was member of the Minnesota Surveyors' and Engineers' Society. The University of Michigan, my alma mater, conferred upon me at its 1915 Commencement the honorary degree of Doctor of Engineering

In my home city I have not sought nor held any important public office. At one time I was member of an advisory committee on the purchase of books for the Public Library. Also was appointed by the Commissioner of Public Works member of an advisory board of engineers. Have served on the Grand Jury of the Eleventh District, as foreman. Was for a time president of the Union Building & Loan Association. Am an honorary member of the Duluth Boat Club, that splendid institution which is doing so much for our city. Here insert (a)

Very recently I have suffered the loss of my dear wife, who for more than forty years of happy married life had been my constant companion. Mrs Darling passed away June 11 1920 after a long illness and with sufferings from which only death could afford relief. At our age we were both well aware that such a separation should be expected in the near future, and so the dread event was less of a surprise. It is a comfort for me to think of the long life that was allotted to her, seventy three years, with the enjoyment of many privileges. A good friend has very happily and truthfully said in a letter which I received last month: "That a glorious privilege it is that we can store up pre-

cious moments of happiness and companionship - treasures priceless and unfailling. Dear ones may pass from our sight but memory holds them with us forever."

My health is generally good and life for me is a joy. I am looking forward to more years of enjoyment and the pursuit of scientific studies of which I am fond. The wish possesses my mind to know more about the world in which we live and of the greater universe around us. Possibly some of the questions which now are obscure and puzzling may be cleared up while I am living, by some of the bright intellects that are giving them careful study

Duluth, Sept 1 1920

John H. Darling



SHARE JOY AND LIVE LONG, DARLING AVERS

**Duluth Astronomer, 90,
Looks Back and Gives
His 'Recipe.'**

If you want to retain your happiness share it with others! This is the advice of John H. Darling, prominent Duluth engineer and astronomer, who today observes his 90th birthday anniversary.

And so for years he has opened the way for thousands of Duluthians and tourists to visit his astronomical observatory at Observation park, Ninth avenue west and Third street, where he has devoted his time to informing the public of celestial bodies in space. Forced to retire in 1913 from active service as government engineer here, because of ill health, Mr. Darling diverted his efforts to the hobby of astronomy, in which he had been interested all his life. Through it he derives a pleasure which has been beneficial to him in his old age.

BUILT IN 1917

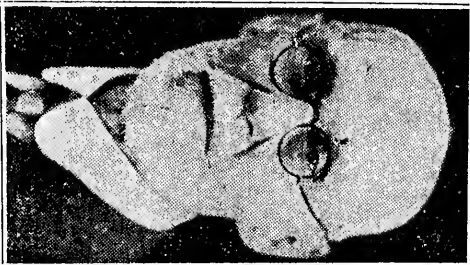
The observatory was completed in 1917 at a cost of \$12,000. Included in the equipment of the observatory are a nine-inch refracting telescope within a 15-foot dome, a lecture room, a planetarium and a library.

Because of his contribution to the city's growth Mr. Darling in 1930 was named the sixth member of the Hall of Fame. The observatory, when he dies, will become the property of the city of Duluth and will be maintained partly through an endowment fund to be started by his estate.

When it comes to living to a ripe old age Mr. Darling believes in these ideas:

Select long-lived parents. Eat wholesome food, and in moderation, and don't be too much concerned about the number of vitamins.

Avoid medicines, except in extreme emergencies. They are generally more or less irritating and injurious to the stomach and



JOHN H. DARLING.

the actual healer. The use of laxatives is a widespread evil. Take plenty of rest, when in advanced life. Avoid fatigue.

Avoid worry as much as possible. Try and make the best of what cannot be helped.

During active life accumulate a competency for old age. This will greatly contribute toward comfort and contentment and long life.

Get interested in some hobby which will keep you pleasantly occupied after retirement from active work.

Born in Lenawee county, Mich.,

April 15, 1847, Mr. Darling received his early education at Tecumseh, Mich. Despite ill health which hindered his education as a youth, he progressed rapidly when he entered high school and in 1873 graduated from the University of Michigan with a civil engineer's degree.

MARRIED IN 1880

He married Miss Adelaide Ford at Tecumseh, Mich., Feb. 25, 1880. She died in Duluth June 11, 1920. He has no children.

Mr. Darling said last night "As I enter my 10th decade I confess to feeling rather proud of my years, especially when someone tells me I look 10 years younger. I am feeling well and my sight and hearing are unimpaired, or at least nearly as good as ever."

He admitted that his hobby of astronomy continues to interest him and keep him occupied. "There is nothing like a hobby to fill in the later years of one's life," Mr. Darling asserted.

"The great subject of astronomy never fails to furnish new thrills as more and more discoveries are being made in distant space, bringing to our view new worlds and galaxies apparently without limit."

The purpose of his observatory, he explained, is to exhibit and explain to Duluthians and tourists the celestial objects within its reach and to tell them of the discoveries made at larger observatories. He said, "It is a pleasure for me to do this."

40 YEARS ON JOB

Turning back to earlier times in his long life, his profession and life work was engineering, and for 40 years he was in the employ of the government, starting immediately after his graduation from Michigan university.

First he was engaged on the United States lake survey as assistant engineer for nine years, then two years with the St. Paul government engineer office on river

and harbor work, and in 1884 came to Duluth to work on this harbor and other Lake Superior harbors. Here he was engaged as principal assistant engineer for 29 years before retiring in 1913.

"When I came here 52 years ago, Duluth was a small city of around 10,000 people, but I have seen it grow to more than 100,000. It is a satisfaction to know that my work on the harbor improvements contributed towards the growth of Duluth and Superior," he said last night.

LOOKS TO FUTURE

"Sometimes I give a little thought to the question, How much longer can I live? The insurance men with their mortality tables tell me the expectation of life at my age is 14.42 years—less than a year and a half, but I believe I can do better than that."

"I should like to live to see the huge 200-inch telescope completed in California and have it solve some of the riddles that are puzzling astronomers and other thoughtful people. This is too much for me

to expect, as it will take probably as much as five years to build the new observatory, and the results from observations will come in slowly after that.

"However, there is plenty of interest in watching the course of events and new discoveries in this world of ours, as well as in the study of the wonderful universe beyond, so that for me life is a joy."



John Darling with Pennyfarthing bicycle, March 1882 in Detroit, Mich.

PORTION

OF THE

Samuel Darling b 1695 d 1760

Thomas Darling b 1719 d 1789
m. Abigail Noyes b 1724 d 1797

DARLING
GENEALOGY

Abigail Darling b 1716 d 1800
m. Chas Chauncey b 1741 d 1823

Isaacson, Darling b 1718 d 1764

Samuel Darling b 1719 d 1842
m. Charlotte Ely b 1757 d 1847

Thomas Darling b 1753 d 1818
m. Mary Noble d 1766

Anne Darling b 1755
m. P. Clark

Dorothy Darling b 1757

Joseph Darling b 1759 d 1800
m. Amelia White b 1767 d 1846

Samuel Darling b 1761 d 1841
m. Samuel Burr

Chas Chauncey Darling b 1759 d 1827
m. Abigail Maria Davis b 1758 d 1823

Seven elder brothers and sisters

Joyes Darling b 1759 d 1846
m. Ann Foster d 1851

John Darling b 1759 d 1825
m. Susan Longway b 1766 d 1821

Thomas Darling b 1759 d 1812
m. Lucy Weston b 1755 d 1811

James Allen Darling b 1756 d 1823

Mary Darling d. in childhood

Grace Darling b 1759 m. Capt. James
b 1759 d 1811 m. 2d son of
b 1759 d 1811

Charles W. Darling
m. Angeline Elizabeth Richardson

Elizabeth Darling b 1813 d 1852

Grace Darling b 1817 d 1857

John Darling b 1828
m. Dr. R. Brice

Maryes Darling b 1835 d 1857

James Darling b 1836 d 1857

Henry Darling b 1840 d 1873
m. Elizabeth Scott b 1844 d 1874
m. 1856 Melinda Cooper b 1812

Mary Josephine Darling b 1812 d 1857
m. Robinson Smith

Ann Emma Darling
m. Sidney Stearns

Catherine Darling b 1823
m. James W. Ross

Jane Darling
m. Fields Baldwin

Mary Ann Darling
m. Charles Bishop

Luella Darling

DARLING GENEALOGY - 1239-1700

- (1) Edward 1st., King of England. b1239, d. 1307. Crowned 1274.
- (2) His daughter, Princess Joan, married Gilbert de Clare, ninth Earl of Clare, seventh Earl of Hertford, and third Earl of Gloucester.
- (3) Their daughter, Lady Margaret de Clare, married Hugh, second Baron Audley, created, 1337, Earl of Gloucester.
- (4) Their daughter, Lady Margaret Audley, married Sir Ralph Stafford, K.G. created, 1351, Earl of Stafford.
- (5) Their son, Hugh Stafford, Second Earl of Stafford.
- (6) His daughter, Lady Margaret Stafford, married Sir Ralph Neville, K.G., created, 1397, Earl of Westmorland, Earl Marshal of England.
- (7) Their daughter, Lady Philippa Neville, married Thomas Dacre, sixth Baron Dacre.
- (8) Their son, Hon. Thomas Dacre, married Elizabeth, daughter of Richard Bowes.
- (9) Their daughter, Lady Joan Dacre, married Sir Richard Fienes, seventh Baron Dacre.
- (10) Their son, Sir Thomas Fienes, Knt., married Lady Alice Fitz-hugh.
- (11) Their son, Thomas Fienes, Lord Dacre of the South.
- (12) His daughter, Catherine Fienes, married Richard Loudenoys, of Briade.
- (13) Their daughter, Mary Loudenoys, married Thomas Harlakenden, of Worthorn.
- (14) Their son, Roger Harlakenden, of Kenardiston, in Kent.
- (15) His son, Richard Harlakenden.
- (16) His daughter, Mabel Harlakenden, b. 1614, married, first, in 1636, John Haynes, Governor of the Massachusetts Colony, in 1635; and first Governor of Connecticut, in 1639. Every alternate year thereafter, which was as often as the constitution permitted, he was re-elected, up to the time of his decease, in 1654.
- (17) Their son, Rev. Joseph Haynes, b 1641, married Sarah Lord, b 1638.
- (18) Their second daughter, Sarah Haynes, b 1673, married, in 1694, Rev. James Pierpont, of New Haven, who was one of the founders of Yale College. He was born in 1659, and his ancestors added two more letters to their name than did the New England family.
- (19) Their only child, Abigail Pierpont, b 1696, married, in 1716, Rev. Joseph Noyes, of New Haven.
- (20) Their second daughter, Abigail Noyes, b 1724, married, in 1745, Thomas Darling, of New Haven, Chief Justice of the Court of Common Pleas, in the State of Connecticut. b. 1719, d 1789.
- (21) Their second son, Thomas Darling, b 1753, d 1815, married Mary Dibble, d 1816.
- (22) Their second son, John Darling, b 1789, d 1825, married Susan Hemingway, b 1788, d 1824.
- (23) Their only son, Henry Darling, b 1810, d 1873, married, in 1836, his second wife, Matilda Osborn, b 1812. Hon. Henry Darling was a member of the Michigan State Legislature, in 1851.
- (24) Their fourth daughter, Julia Frances Darling, married, in 1866, Eugene R. Haanel, born in Breslau, now of Syracuse, N.Y., Doctor of Philosophy, and Professor in Syracuse University.

Note. The foregoing genealogy, from (1) to (20), is copied substantially from a paper received Jan. 25, 1894, from Gen. Charles W. Darling.



LINE OF DESCENT FROM JOHN HAYNES WHO CAME FROM ESSEX, ENGLAND TO MASSACHUSETTS
IN 1632. HE WAS GOVERNOR OF MASS. AND CONNECTICUT 1635 AND 1639

AMERICAN

1. GOV. JOHN HAYNES - d. 1654
m. MABEL HARLAXENDEN b. 1614 -
2. REV. JOSEPH HAYNES b. 1641 -
m. 1668 SARAH LORD b. 1638 -
3. SARAH HAYNES b. 1673 -
m. REV. JAMES PIETPOUNT b. 1659 -
4. ABIGAIL PIETPOUNT b. 1696
m. REV. JOSEPH NOYES IN 1716
5. JUDGE THOMAS DARLING b. 1719 - d. 1789
m. ABIGAIL NOYES b. 1724 - d. 1797
6. THOMAS DARLING b. 1753 - d. 1815
m. MARY DIBBLE - d. 1816
7. JOHN DARLING b. 1788 - d. 1825
m. SUSAN MEMINGWAY b. 1788 - d. 1824
8. HON. HENRY DARLING b. 1810 - d. 1873
m. MATILDA OSBORNE b. 1812

CANADIAN

9. DR. EUGENE HAMMEL b. 1841 - d. 1937
m. JULIA DARLING b. 1845 - d. 1914
10. GRACE HAMMEL b. 1869 - d. 1937
m. DR. CHARLES THORNDIKE BOWLES b. 1874 - d. 1956
11. JEFFREY BOWLES b. 1907 -
m. JEANE SANDY b. 1907 -





1066

- - - - - SOURCE OF MABEL HARLAKENDEN

WILLIAM THE CONQUEROR EDGAR ATHELING, HEIR OF THE SAXON LINE
 WILLIAM II, RUFUS, KING OF SCOTLAND
 1100 HENRY I = MATILDA CANMORE = MARGARET ADELE = STEPHEN COUNT OF BLOIS
 STEPHEN = MATILDA GEOFFREY PLANTAGENET OF ANJOU
 HENRY II (GRANDSON OF HENRY I) ROSAMOND DE CLIFFORD WILLIAM PLANTAGENET
 HENRY NAVARRE ALPHONSE OF CASTILE WILLIAM LONGPÈRE
 RICHARD I ALPHONSE IX OF LEON PILOS DE COUSHAY, EMPEROR OF CONSTANTINOPLE
 GEOFFREY BLANCHE = LOUIS III OF FRANCE FERDINAND OF CASTILE = JANE HENRY DUKE BARBANT
 JOHN SACKLAND ELEANOR = JAMES OF ARAGON LOUIS IX ROBERT THE BRAVE HENDRINE II KING HUNGARY
 1216 HENRY III PHILIP THE BOLD = ISABEL 2. MARGARET ROBERT DE HOLLAND EDMOND ALAN EARL OF ARUNDEL (beheaded)
 1272 EDWARD I = 1. ELEANORA OF CASTILE 2. MARGARET OF FRANCE BLANCHE = HENRY OF NAVARRE EDMUND PLANTAGENET 2ND SON
 1307 EDWARD II = ISABELLA PRINCESS JOAN = GILBERT DE CLARE, 9TH EARL OF CLARE HUMPHREY DE BEHAN
 1327 EDWARD III = PHILLIPA OF HAINAUT MARGARET = HUGH 2ND BARON AUBLEY HUGH DE DUDLEY THOMAS EARL OF HEREFORD
 EDWARD THE BLACK PRINCE LADY MARGARET = SIR RALPH STAFFORD, CREATED 1351 EARL OF STAFFORD RICHARD EARL ARUNDEL
 WILLIAM OF HATFIELD HUGH STAFFORD 2ND EARL
 LIONEL DUKE, EARL OF KENT THOMAS HOLLAND LADY MARGARET STAFFORD = SIR RALPH NEVILLE
 JOHN OF GAUNT, DUKE = 1. BLANCHE OF LANCASTER 2. CONSTANTIA OF CASTILE LADY MARGARET STAFFORD = CREATED 1397 EARL WESTMORELAND, EARL MARSHAL OF ENGLAND
 EDMOND OF LANGLLEY - DUKE JEANE = WILLIAM, LORD WILLOUGHBY THOMAS ARCHBISHOP OF CANTERBURY, OF NORTHAMPTON
 THOMAS OF WOODSTOCK, DUKE OF GLOUCESTER ELEANOR PHILIPPA = EDMOND MORTIMER JOHN TALBOT, EARL OF SHAWSBURY = MARGARET
 WILLIAM OF WINDSOR ROGER, EARL JOHN DE BEAUFORT, EARL
 RICHARD II ANNE = RICHARD, EARL OF CAMBRIDGE JOHN 1ST DUKE OF SOMERSET
 HENRY IV = MARY RICHARD DUKE OF YORK SIR JOHN BOURCHIER = MARGARET THOMAS, 6TH BARON Dacre = ELIZABETH BOWES
 HENRY V = CATHERINE OF FRANCE GEORGE ARCHBISHOP OF YORK AND CHAN-
 HENRY VI = MARGARET OF ANJOU EDMOND OF WADHAM = MARGARET NON. THOMAS Dacre = ELIZABETH BOWES
 EDWARD IV EARL MARSHALL AND SIR FREDERICK SYDNEY ANNE RICHARD EARL WARWICK
 EDWARD V DUKE JOHN HOWARD ELIZABETH HENRY, LORD FITZHUGH = ALICE LADY JOAN Dacre = 7TH BARON Dacre HENRY LORD FITZHUGH
 1483 SLAIN BATTLE
 RICHARD III BOSWORTH 1485 * SIR THOMAS FIENES = LADY ALICE FITZGERARD HENRY 13TH EARL = CICELY
 HENRY VII = ELIZABETH THOMAS FIENES, LORD Dacre OF THE SOUTH ADAM WINTHROP = ALICE WINTHROP
 HENRY VIII = CATHERINE OF SPAIN, 2. ANN BOLIN 3. JANE SEYMOUR CATHERINE FIENES = RICHARD LOUDENOYS OF BRIADE IN SOSSEX ADAM
 EDWARD VI MARGARET = JAMES IV OF SCOTLAND MARY LOUDENOYS = THOMAS HARLAKENDEN OF WORTHORN
 MARY JAMES V = MARGARET = MATTHEW, EARL OF ESSEX ROGER HARLAKENDEN OF REHARDISTON IN KENT ADAM = 1. ALICE HENRY
 ELIZABETH MARY STUART = HENRY LORD DARNLEY PURCHASED A MANOR AND 1500 ACRES FROM EARL OF OXFORD JOHN WINTHROP
 JAMES I, VI OF SCOTLAND RICHARD HARLAKENDEN GOV. OF MASS
 MABEL HARLAKENDEN = JOHN HAYNES, GOV. MASS AND CONN. PAPER FROM

* NOTE: I HAVE SUBSTITUTED SIR THOMAS FIENES FOR SIR JOHN KNIGHT IN ACCORDANCE WITH GEN. CHARLES W. DARLING, RECEIVED

BY HARRIS, JAN. 23, 1894.



